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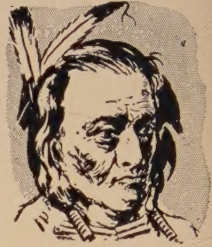


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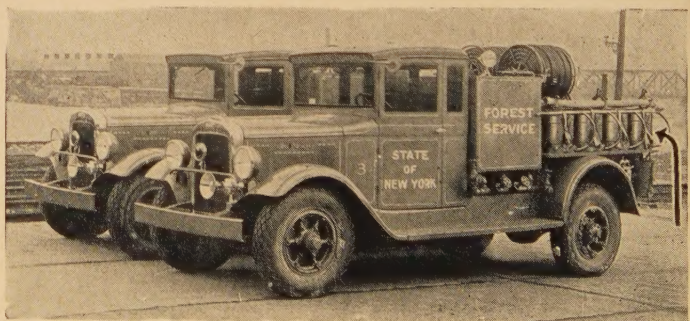


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CONTENTS



| | |
|---|-----|
| Editorial: "A Three Point Program"..... | 269 |
| A Plea for a Fair Appraisal of Federal Forestry Reorganization | 271 |
| EMANUEL FRITZ | |
| Comments | 276 |
| SAMUEL T. DANA | |
| Our Conservation Department: Agriculture..... | 278 |
| WALTER MULFORD | |
| Democratic Principles of Administration..... | 280 |
| H. H. CHAPMAN | |
| The Extension Forester and Wildlife Conservation..... | 283 |
| I. T. BODE | |
| Forestry in Our Constitutions | 288 |
| JOSEPH S. ILLICK | |
| Recent State Laws on Forestry..... | 300 |
| KATHERINE MARKWELL | |
| Institutional versus Technological Factors in Wood Consumption..... | 306 |
| JULIAN S. DUNCAN | |
| Susceptibility of Ribes to Cronartium Ribicola in the West..... | 312 |
| J. W. KIMMEY | |
| Blister Rust Damage to Merchantable Western White Pine..... | 321 |
| T. S. BUCHANAN | |
| Forest Planting under the Hewitt Bill..... | 329 |
| Briefer Articles and Notes..... | 335 |
| The Chief Forester's Report; Chamber of Commerce of the United States Favors Flood Control Act of 1936; Forest Planning—The Role of Economics; Lest We Forget; The Standard Error of Estimate of Tree Volume from the Logarithmic Volume Equation; W.P.A. Crews Find Copper Sulphate Effective Against Dutch Elm Disease; Note on "Log Grades and Lumber Grades"; Forestry in Nigeria; The International Congress on Timber Utilization at Paris; Revegetation of Small Gullies Through the Use of Seeded Earth-Filled Sacks. | |
| Reviews | 350 |
| Textbook of Dendrology; Foundations of Silviculture upon an Ecological Basis; Het Geslacht Populus in Verband met zijn Beteekenis voor de Houtteelt. (The Genus Populus and its Significance in Silviculture); Practical Tree Surgery; Statistical Methods Applied to Experiments in Agriculture and Biology; The Small Sawmill in New York; Forest Protection. | |
| Correspondence | 359 |

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EDITORIAL

"A THREE POINT PROGRAM"

THE 1937 Report of the Chief of the Forest Service is an interesting document. Its greatest interest does not lie in the fact that it describes in a terse, concise manner the achievements of the Forest Service during the past year, but rather in the fact that it attempts to evaluate the present forest situation in America and to indicate a public course of action in a three-point program.

The three-point program proposes (1) increased public ownership and management; (2) extended public cooperation with private owners; and (3) public regulation of private forest lands to protect broad, vital public interests. Few informed people would take much exception to the desirability if not the necessity of this course of public action, provided it does not extend beyond certain more or less well defined limits. The three-point program sets a few but not enough of the important limits. To some extent the individual reader is permitted to set his own mark. As a result, the public forest enthusiast becomes jubilant, the skeptic remains skeptical, and the private forest owner gets a bad case of "big jitters."

On most matters of forest policy American foresters are characteristically dissident. However, on one question, namely the necessity of increased public forest ownership, there is almost complete unanimity of opinion. To be sure, there are some differences of opinion regarding the

details, but on the whole, increased public ownership and management of forest land has broad and militant support among American foresters.

The Forester calls attention to the fact that splendid progress has been made in extending public ownership of forest lands. To June 30, 1937 the National Forest Reservation Commission authorized the purchase of 15,998,577 acres of forest lands in 31 states, largely east of the Mississippi River.

Foresters may take justifiable pride in the forest land purchase program of the National Forest Reservation Commission. The purchases have been made efficiently, economically, and in the public interest. The entire program has been signally free of scandal, impropriety, and turpitude. Even with adequate funds it is not an easy task for any public agency to purchase advantageously an area almost three times as large as the State of Vermont. The fact that this has been accomplished is highly complimentary to the individual and collective integrity of the personnel of the Service. The Forester also calls attention to the fact that outside already established National Forest purchase units there are 125 to 150 million acres of land for which public ownership, state and federal, appears to be the best solution. There is ample room for honest and sincere differences of opinion concerning the extent to which public owner-

ship of forest land should be carried. Manifestly, however, the purchase or acquisition of 125 to 150 million acres of land will require many years even under conditions most favorable to public acquisition. If, in the meantime, the private forest land owner demonstrates his interest in, and his capacity to manage any part or all of this land, he probably will have little competition from public agencies in its acquisition. On the whole, there seems to be little if any valid basis for objections to the Forester's program of public ownership.

The proposed program of public cooperation with private owners is not so explicit, although it might well have been. The issues here are perfectly clear. The public cooperation program as stated will probably make few if any converts among industrial owners of timberlands. To do this a more realistic if not materialistic approach would have been necessary. It is, of course, barely possible that the Forester did not intend to make converts among industrial owners of timberlands. Nevertheless, there appears to be a definite "come ye hither" appeal in the public cooperation section of the program. It is stated that, "Congress has set up cooperation—including federal funds—as a method for helping private owners establish on their lands those forest practices so necessary to the public welfare." A profession of belief in the efficacy of such cooperation would have been reassuring, but there is, nevertheless, no good reason for questioning the sincerity of the Forest Service's interest in public cooperation. The fact that the Service has created the Division of State and Private Forestry and the activities of the personnel of that division should be ample proof of the Service's genuine interest in the problems of a private owner of timberlands.

The public regulation features of the three-point program will probably arouse foresters and private timberland owners more than any or all the other features

of the program. This is not to be unexpected, despite the fact that the program does not propose any specific type of public regulation. The Forester accepts as a demonstrated and historical fact that public ownership and public cooperation are not adequate to meet the existing situation, and that a margin of sovereignty over private forest lands is also necessary. This position should cause no surprise to private owners of timberlands, because somewhat similar statements have emanated from the Forest Service for at least fifteen or twenty years. Not a few private owners of timberlands have reached almost the same conclusion. The mere fact of governmental regulation is not a new experience to American industry. The important consideration, therefore, is not so much a question of whether or not there should be public regulation of private forest lands as it is one of how and on what basis it should be regulated.

It will not be an easy task to draft a democratic, reasonable, workable program of public regulation that will safeguard the public interests; do justice to one of America's great industries and the labor employed by it, directly or indirectly; satisfy the farm woodland owner; and, at the same time, not pass on to the consuming public a heavier burden of increased costs for lumber and other forest products. It is quite improbable that the first attempt at public regulation of private forest land will be perfect. Future changes and adjustments will have to be made. It appears clear, however, that public regulation of some form or another is inevitable and that foresters and private timberland owners may as well meet the issue frankly and courageously. The ultimate fate of the largest part of the best forest land in America rests to a considerable degree on the margin of public sovereignty over it. In the long run, the American people will not be satisfied with anything less than adequate measures to safeguard its productivity.

A PLEA FOR A FAIR APPRAISAL OF FEDERAL FORESTRY REORGANIZATION

By EMANUEL FRITZ

University of California

Has the attitude of the forestry profession in the matter of reorganization and realignment of federal conservation bureaus been constructive, and have foresters been guided by a judicial appraisal of the pros and cons of this controversial and widely publicized subject? The author does not think so and here gives his reasons.

THE federal reorganization controversy, as far as forestry is concerned, has become a battle of personalities. As such, it is doing real forestry much harm and is bringing ridicule upon the forestry profession. It is unconsciously strengthening the suspicion that foresters are emotional and arrogant; that the Forest Service is more concerned over its own welfare than over the progress of forestry, and that foresters think en masse and not as individuals. Unless I have missed it, I know of no written material or of meetings in which the pros of reorganization have been thoroughly debated along with the cons. So far, the battle has been one-sided. A cabinet member proposes that the Forest Service be transferred to another and new department. Right off, the opposition begins. No inquiry, apparently, is made as to the possible merits of a change. It is assumed that there is a hidden and ulterior motive and therefore the plan must be defeated. Strong and plausible statements are issued to the press and to the profession in opposition; not a word by way of analyzing the possibilities. This does not appeal to me as the way foresters should go about arriving at conclusions. We have been dogmatic about forestry too long. It is time we used more appropriately the superior intelligence we foresters like to feel we have in all matters concerning conservation, economics, politics, and lately also social economy.

The purpose of this article is *not* to argue in favor of transferring forestry to

a new department nor in favor of retaining it in its present department. Its principal aim is to exhort foresters to think things through; to accept nothing for granted; to be analytical, not dogmatic; and, to be tolerant and moderate. The article, nevertheless, attempts to point out the error of assuming that a transfer is "fraught with danger," and to plead for vision for the future of forestry as against more power for foresters.

In the present controversy, one is led to feel that the proposed transfer of the Forest Service from the Department of Agriculture is a new idea, that its author is the present Secretary of the Interior and that he has an ulterior motive. It is *not* a new idea. Other presidents and other secretaries of the Interior have broached similar plans. With a single notorious exception, all were really big men, and, in the absence of proof to the contrary, we must, in justice to them, assume they had no ulterior motives. The attack on the person of the present Secretary of the Interior has befogged the entire issue, and, so far, it has not shown up his opponents as being bigger and better men.

When such men as Coolidge, Hoover, Work, and Wilbur separately recommended reorganization, I am inclined to feel that there might be advantages which these able men have seen and which have not been taken into judicious and fair consideration by our profession.

It is averred that the present Secretary of the Interior is a glutton for power and wants the Forest Service under him for

the added prestige and power it will give him and his department. This does not sound honest. Has ever a federal bureau been more power-struck than the Forest Service? Have we had many politicians who have craved power more than the forester-politician who has been most critical and most outspoken against the Secretary? If the Secretary is really seeking more power, he has added a new reason for repeating the transfer proposal, because, certainly, the preceding secretaries and the preceding presidents cannot be accused of having had Napoleonic ambitions for power.

It is asserted that "conservation is too big" to risk in the new department of conservation. That doesn't sound logical. There might, of course, be an element of risk, but how do we *know* that the new department and its head would not be even more favorable to it, and particularly to forestry, than its present department, nor that the Department of Agriculture will always be fair to it? As to bigness, that is an argument that kicks back. The Forest Service itself is very big and the Department of Agriculture is nothing if not mastodonic. It administers livestock, cotton, tobacco, and cereal growing, the huge A.A.A. program, the soil conservation program, etc., etc. Some of its activities are open to serious question from the standpoint of sound finance and social economics, and even of sound conservation of human effort. So, if conservation is "too big" why keep it in a department already oversize and unwieldy and already showing signs of being more interested in class legislation than in the welfare of the common man. It is conceivable that conservation would get much better consideration in a department specifically created for it, and that, if a disposition to exploit it selfishly develops, it can be more easily detected and corrected.

It is asserted also that forestry has prospered in the Department of Agriculture and it is implied that it will not con-

tinue to prosper in the hands of the proposed new department of conservation. There is no arguing the fact that forestry has done well for itself under the Department of Agriculture. But has it made the best of its opportunities there, or has it been opportunistic? Under the Department of Agriculture, forestry is developing a bureaucracy that is not safe. I suspect that the opposition to any kind of transfer is motivated in large part by fear that this entrenchment may suffer. What if it does? Seems to me it would be a good thing. Bureaucracy in any field is dangerous.

It is stated that the Department of the Interior has never shown evidence of interest in conservation and that it was for that reason forestry was taken away from it in 1905 and placed in the Department of Agriculture. Is this a fact? Did not the better possibility of adequate appropriations through the agriculture appropriation committee have a great deal to do with it? In those days the Department of the Interior was not so well treated by Congress, while the farmers got their way, as they do now. Today, however, we have an entirely different budgetary set-up, under which each bureau's demands are considered on their merits.

We lose sight of the fact that the Department of the Interior had the job of doling out public lands given to it by Congress. It was the law. It was not so much the fault of the department as it was of the public attitude and conscience of the time that laxness developed in administering the law. Wasn't the great Carl Schurz a secretary of the department in its early days when giving away lands took precedence over husbanding their resources? He demurred unsuccessfully because the public was not then interested in conservation. Times have changed. The public knows now those laws were unwise.

Much venom has been shot at the Department of the Interior because of its not

too savory past. Because it has been guilty at times of gross disregard of the public's interests is no proof that it is afflicted with chronic dishonesty. One could be very critical, too, of the Department of Agriculture for policies that have resulted in an increased cost of living, and there is no guarantee whatever that we may not some day have a secretary of agriculture inclined toward exploiting public timber lands. It is natural to be suspicious of an organization because of its past sins. The present interior secretary makes no secret of the bad past of his department; his well established reputation for honesty is proof itself that the morals of one of his predecessors is as abhorrent to him as it is to us. Imputing to him motives for crippling conservation sounds like hypocrisy. It is regrettable that he himself has recently slipped into making the errors characteristic of his critics—the damning of lumbering as a destructive devastating industry. Here he has held the industry unfit for consideration because of its past anti-conservation attitude. Had he known it, he could have made some strong supporters among lumbermen by giving them recognition for and encouragement to continue the substantial improvements now under way. His expressed attitude toward the lumber industry should make his forestry opponents less uneasy should he become head of the proposed Department of Conservation! He used their own language.

The plan to create a department of conservation by merely changing the name of the Department of the Interior is feared by some to mean the retention in policy-making capacities of a few old members who, it is alleged, are not conservation minded. It is not unlikely that men who have been brought up in an atmosphere of exploitation may not take kindly to conservation; on the other hand, it is a rather hasty assumption that the secretary will permit boring from within and that conservationists are not smart enough to

detect and publicize it, or that these men are not intelligent enough to adjust themselves to the new objectives. Since foresters have had the larger experience in organized conservation activities and have developed in the Forest Service a bureau noteworthy for its interest and integrity, high average ability and technical skill, it is reasonable to expect the new secretary of conservation to draw upon the profession heavily for assistance in effecting organization, establishing policies, and getting the new department properly under way. But suppose he doesn't; are not foresters strong enough to assert themselves should the secretary fail to do right by conservation? If the Forest Service isn't strong enough to determine the conservation attitude of the departmental overhead personnel, where has it been all these years? Let it not be assumed that the Forest Service is so perfect that it may not benefit from a certain amount of reorganization or shaking up itself. Some of its own policy-making higher officers seem to lack a sense of proportion and even a grasp of the changes that have taken place in forestry and economics, since, as young men twenty to thirty years ago, they were boosted to where they have been ever since. A shift of the Forest Service to another department might be a good time to give the younger, better trained and better balanced men a chance. It seems to me that forestry has been given a golden opportunity and muffed it. Instead of obstructing a logical government change, it might have accepted its desirability and then helped direct it and set the pace for all bureaus of the new department toward an all-time high standard of public and technical service. The present tactics are not likely, if continued, to give foresters the share of active participation in establishing departmental policies that their leadership in conservation philosophy might entitle them. Seems to me we have been and still are our own worst enemies.

Forestry is being referred to as an agricultural pursuit, because forests should be handled as crops. Indeed, forests are crops, and the trees grow on soil, and they develop like other plants. But the analogy ceases there abruptly. Silviculture is vastly different from agronomy; forest management from farm management; forest economics from agricultural economics; forest products from farm products; logging from farm harvesting, and there are other equally divergent steps. Even the purposes of the two are different. The marriage of forestry to agriculture in the federal establishment has not resulted in federal and all state foresters learning from their agricultural extension service colleagues one iota of how to "put over" forestry on private lands. This one fact lends weight to the suspicion that foresters are in agriculture merely as opportunists and not to benefit from its experience. No other bureau of the Department of Agriculture, than its Extension Service, has been so outstandingly successful in winning the respect and confidence of the farm owning and farm operating public. *There* is a bureau that believes in public service and practices what it preaches. In forestry, on the other hand, we have had nothing but strife between public foresters and private forest owners and operators. There is no mutual trust and confidence among the policy makers of the two groups in spite of the fact that the rank and file of both now get along more cordially with one another in the woods. The Department of Agriculture has been signally successful in getting the farmer to improve his methods, but the Forest Service, in the same department, has yet to be able to boast of success in private forestry from its own efforts. Evidently, then, the presumably advantageous contact between forestry and agriculture in one department has not resulted in some important benefits to forestry.

It is noteworthy that the opponents of

transfer never cite the departmental affiliations of forestry in older countries far more experienced in handling this field than we are. The reason is simple when we inquire into their departmental divisions. Likewise, our forestry schools. Many of them are divisions or departments of colleges of agriculture, but with few exceptions, the best ones are independent. Yale, Michigan, Syracuse, Harvard, Duke and Washington have no direct relations to the agricultural colleges of the same states. In one other case, California, an effort has been made to have forestry set up as a separate college. Here again, in most cases, it is the easier money in agriculture that has determined where forestry is taught, and not the needs of forestry itself nor its reputed agricultural aspects.

We have an unfortunate rivalry between principal offices of the Forest Service and the National Park Service. One encroaches on the field of the other. As long as the two bureaus are in different departments there will not be the harmony that should prevail in the interest of the principles of wise land use and in expenditures therefor, which should guide both.

It sounds like good logic to combine all conservation activities under one head. At present, conservationists themselves, divided as they are, work at cross purposes and hence contrary to true conservation. Having all the interests together would make it possible to develop greater consistency in policies, more harmony and some economy. Just what the reorganization should be is open to debate. Shall it be a new department, a subdepartment in an existing department, or what? Conservation activities, all of them, *must* be brought together. Until they are, conservation will be subordinate to bureaucracy. It is unfortunate that the bill presented to Congress proposes creating a new department so clumsily. If it had provided for a new department without mentioning the present Department of the Interior, much of the criticism would be untenable. The

old Department of the Interior could then have been gradually closed out and finis written to its history. The end result probably would be the same, but it would have "gone down" better with the proponents of the status quo for forestry.

Some serious criticism has been directed against the Byrnes bill, but whether it is well founded or not is open to question. Critics read into it a scheme to dismember forestry. If that is correct, then that part of the bill is bad. Even research is said to be slated for separation. That, too, if true, would be bad; yet, if separated, there might be less chance of playing forestry politics with it. Private forestry, according to opponents of the bill, is slated for separation from the administration of the National Forests, private forestry being left in the Department of Agriculture. That, too, is not desirable, but is not as bad as it seems. At least the Forest Service could then concentrate on its major job—that of administering the National Forests and making a thorough success of it; while the Department of Agriculture's great Extension Service could be depended upon to use the same wise tactics in promoting private forestry that it has so successfully used in promoting better farming. Feared also is a breakdown of the merit system. This is a well-founded fear, because the bill threatens the removal of policy making officials from Civil Service requirements. It makes really little difference where the Forest Service is placed and if it is divided as suggested, but it does make a very big difference if the heads are not subject to the merit system—the difference between continuing a high professional standard among the rank and file and its complete breakdown. The merit system must be held inviolate.

Most foresters are opposed to transfer. The Society of American Foresters officially opposes it through unanimous action

of its Council, of which I was a member when the vote was taken. It is doubtful, however, if many foresters studied all sides of the proposition, taking it for granted perhaps that any hands laid on forestry must be selfish hands.

Of first import is the welfare of forestry, but only so far as this welfare is unselfishly directed 100 per cent toward public welfare. Those interested in real forestry, forestry *in the woods*, must be as critical of the pronouncements of forestry leaders as they are of those holding opposite views. All are human and all are subject to the same whims and ambitions. The old and smug, though unconsciously held, idea that a forester can't be wrong has already given the profession a disposition for self-righteousness not at all warranted.

Reorganization is certain to go through some day. It cannot be obstructed many years. In some form it is needed. It would seem to be far more advantageous to forestry if foresters would recognize this need and direct their boundless energies toward a scheme that will satisfy all in its major parts. Foresters have always had a remarkable knack for antagonizing outside groups. This characteristic is showing up strongly in the present controversy. Opposing a change just because it upsets the status quo is not the way support for principles is gained, nor progress is made. It may not react to the advantage of forestry when the change is finally made.

As noted at the outset, it was not my intention to oppose or favor the present plan of reorganization. But I hope I have succeeded in advancing some ideas on the subject that will help develop a sounder approach to an answer. It is hoped also that in the future, in taking up controversies, the profession will be guided by a judicial attitude and not by emotion.

COMMENTS

By SAMUEL T. DANA

Vice-President, Society of American Foresters

PROFESSOR FRITZ'S article is essentially an attempt to force reconsideration of the stand taken by most foresters against the proposed reorganization of the forestry work of the federal government. He does this by reciting certain arguments in favor of the reorganization, without definitely committing himself to them, and by accusing the majority of the profession of being smug, self-righteous, emotional, dogmatic, and prejudiced. Sufficient self-analysis to determine whether any of these adjectives fit our particular cases will do none of us any harm.

So far as arguments are concerned, Professor Fritz produces nothing new. As he himself points out, the effort to get forestry back into the Department of the Interior is one of long standing, and the arguments for and against such a move have been worn threadbare. Claims that the transfer is justified by the changed attitude toward conservation in the Department of the Interior, by the desirability of concentrating all conservation activities in a single department, by the unwieldiness of the present Department of Agriculture, by the "power-struck" bureaucracy being developed by the Forest Service in its present position, by the obvious differences between forestry and agriculture, and (a point overlooked by Professor Fritz) by the alleged similarity between certain state departments of conservation and the proposed federal Department of Conservation, have been considered and the counter arguments presented time and again by opponents of the transfer. The latter may be wrong, but if so it is because of poor judgment and not because of any disposition to evade the issues involved.

Human nature being what it is, the appearance of a certain amount of emotion in debates on a question of this sort is probably inescapable; but the assertion that the controversy "has become a battle of personalities" seems to me quite unwarranted. As a matter of fact I think that opponents of the measure have for the most part made a strong and, in view of the attitude and expressions of the Secretary of the Interior, a remarkably successful effort to keep the discussions on the plane of reason. The imputation of ulterior motives, so far as it has played any part in the picture, is by no means peculiar to either side, and even crops out in the comments of so impartial an observer as Professor Fritz.

The suspicion that "foresters think en masse" seems to be curiously at variance with the more commonly accepted view that they are so individualistic as to make professional solidarity difficult to secure even on matters of major importance. The very fact that so much unanimity exists on the subject of reorganization, in a group where unanimity is so rare, would seem to offer reasonably satisfactory evidence that for once at least the majority is probably right.

In this connection I wish to refer to the fear sometimes expressed that the Society of American Foresters in general, and the Council in particular, may be subject to domination by the Forest Service. While that is a possibility that cannot be overlooked, long experience in Society activities convinces me that up to this time it has been much more of a bogey than a reality. The Council has frequently criticized or differed with the official position of the Forest Service. A notable example of this occurred some ten

years ago when a Council composed almost entirely of members of the Forest Service opposed vigorously the grazing legislation sponsored by the Service. In the present case I am confident that the members of the Council in opposing the proposed reorganization are expressing their independent judgment and really represent the position of the Society as a whole.

It is unfortunate, in my opinion, that Professor Fritz confines his discussion so exclusively to "forestry", when as a matter of fact other conservation activities such as wildlife management and soil conservation are just as intimately involved, and their transfer to the Department of the Interior just as vigorously opposed by the groups interested in these particular fields. Perhaps the most extraordinary statement in the entire article is that the "remarkable knack" which foresters have "for antagonizing outside groups is showing up strongly in the present controversy." The actual situation is that for practically the first time in history nearly all of the

conservation organizations in the country are working in the closest possible co-operation, and, very largely under the leadership of foresters, have united in an effort to defeat the proposed reorganization. In other words the present situation is conspicuously one in which foresters are displaying unwanted solidarity both within their own profession and in their contacts with related groups.

Professor Fritz's article will serve the useful purpose that all minority criticism should of making the majority reexamine its position. That this process, if guided by the judicial attitude which he commends, will result in strengthening the Society's decision to maintain its present stand I have no doubt. I hope, however, that it may go further than this. Professor Fritz is right in believing that some reorganization of conservation activities is both essential and inevitable. The Society can perform a real service by mapping out and sponsoring a program which will go beyond mere maintenance of the status quo and will provide a constructive solution to a vexatious problem.



TOWN and community forests that pay as they grow are advocated by the U. S. Forest Service as work reservoirs for unskilled labor. The idea of community forests is not new, according to F. A. Silcox, chief of the Forest Service. In this country alone there are already 1,097 towns and counties in 27 states that now have such forests. They cover an area of 2,889,605 acres, producing fuel and timber, protecting watersheds, providing recreation and wildlife refuges.

OUR CONSERVATION DEPARTMENT: AGRICULTURE

By WALTER MULFORD
University of California

THE position of the Forest Service in the federal government after completion of the pending reorganization, in the judgment of the writer, should be determined on these simple grounds:

It should not be moved from its present position unless there are strong reasons for so doing. The burden of proof rests with those who would have a change.

These would be strong reasons for placing the Service in a new location: more logical grouping of federal functions; closer affiliation with scientific and administrative services on which forestry is partly dependent and to which it can contribute materially; more sympathetic leadership and associations; greater chance of strong financial support; a clouded history of the Forest Service, a record of inefficiency on its part, or present stagnation, any one of which might make transplanting a process holding promise of renewed vigor.

The type of organization under the conditions existing in other nations, or in the states, is not necessarily a good pattern for our federal structure. Failures and successes either of the Department of Agriculture or of the Department of Interior should not weigh heavily in this matter; men, policies, wisdom and effectiveness come and go. The present relative place of politics and of the merit system in the departments concerned should be a determining factor were it not that foresters must be kept out of the spoils system no matter in what department they may be placed. Size of department is of little consequence. Present personalities and bitternesses should weigh not at all.

A Department of Conservation, with its units wisely chosen, would provide a

logical grouping which at first thought appears to be desirable. Really, our federal government is, itself, our department of conservation. Conservation of farm, forest, wildlife, child life, labor, capital, national existence through national defense. Conservation is a philosophy, a function, widely applicable throughout the departments of government. In general usage, it is often given restricted objective meanings: natural resources; or wildlife only. The proposed new department, with natural resources as its field, would in itself be logical. But in assembling its parts to make a well-rounded conservation enterprise, it would disrupt the still more essential unity of the nation's agricultural project. The loss in attempting to dissociate conservation of organic natural resources from agriculture would be far greater than the gain in the separate grouping. Conservation cannot be successfully sorted out from crop production. They intermix, or become one, at countless points. To attempt to divorce them would be most illogical. The result would be endless confusions and overlappings.

The same sciences are the basis of crop production in the forest and on the farm. These sciences are now strongly developed in the Department of Agriculture, where they belong. The federal administrative functions to which the Forest Service can contribute most are, or should be, in the Department of Agriculture. It is improbable that the Service could find more sympathetic Secretaries, or more congenial and stimulating associations, elsewhere rather than in the Department of Agriculture. In general, the Department of Agriculture offers the brightest chances of strong financial backing. The

affiliation with agriculture through a full generation has been a happy one. The record of the Forest Service? Of course, like all organizations of human beings, it is not perfect. Certainly there are violent differences of opinion as to the wisdom of its policies. So it is with every group trying to find its way into new territory in large affairs. It is sometimes said that a business man wins success if he guesses right 55 per cent of the time. Our Forest Service has shown sound judgment, and rendered sterling public service, in far more than 55 per cent of cases. We have every reason to be proud of its record of difficult pioneering of obstacle-strewn trails. It is probable that no other group, in the government or outside, has a cleaner, finer record. And it is now as vital as ever.

The present would be an especially un-

happy time to start anew. Two projects of the first magnitude are in the making: great increase in public ownership of forests; the struggle to effect coordination with the lumber industry so that ultimately we may have a large measure of forestry by private owners. The next decade should yield rich returns for efforts now well under way. Unless there be urgent need, one does not willingly change structural organization just as an epochal forward move is taking form.

Conservation of organic natural resources and crop production are phases of the same broad enterprise, the use of non-urban land for human welfare. So far as these resources are concerned, our federal Department of Agriculture is now almost a complete department of conservation. It should be made entirely so.



COOPERATIVE WILDLIFE RESEARCH

INVESTIGATIONS for improving methods of managing wildlife on forests and farms and other biological studies will be undertaken at a new wildlife research unit being established at State College, Pa., by the Pennsylvania State College, the State Game Commission, and the U. S. Biological Survey. A cooperative agreement of the three agencies for setting up and maintaining the research unit was recently approved by the Secretary of Agriculture.

Pennsylvania is the 11th state to enter into a cooperative agreement with the Biological Survey for investigating ways and means of fitting wildlife resources into land-use programs. Forest and farm-game problems will receive equal attention at the new research unit. Investigations will cover environmental studies, life habits, and the relationships of the more important wildlife species. Trial management areas will also be set up for demonstrating how the information obtained in research may be applied in a practical manner.

Dr. Logan J. Bennett, leader of the Iowa research unit at Ames since its establishment in September 1935, on March 1 assumed charge of the new work in Pennsylvania. Funds for administering and operating the unit are being provided by the State College, the State Game Commission, and the Biological Survey. An advisory committee consisting of representatives of the three cooperating agencies will administer the funds and plan the work.

DEMOCRATIC PRINCIPLES OF ADMINISTRATION

By H. H. CHAPMAN
Yale School of Forestry

There appears to be fairly widespread support in the Society for the proposal to have prospective officers and members of the Council announce the "platform" on which they stand for election. In the following article, Professor Chapman, who has just completed four years of service as president of the Society, gives his views of the dangers of such a proposal and the false premises upon which it is based. Irrespective of the individual's personal views on this subject he should read Professor Chapman's article. The future of the Society, like that of any other democratic institution, is conditioned by the interest and knowledge of the electorate.

IN the discussion at the annual meeting on the question of requiring candidates for the Council to announce, and to run on, political or economic platforms so that the members could tell for *what* as well as for *whom* they were voting (which measure was rejected by the meeting by a close vote) the principles actuating this proposal were quite frankly stated and might have been enlarged upon had it not been for a rule, previously adopted, to limit debate to two minutes. (S. A. F. AFFAIRS, February 1938, page 41.)

The chairman refrained at that time from expressing his opinion that the adoption of such a plan would nullify such progress as had been made towards establishing principles of professional democracy in the Society. Council members are now elected not on a platform that foresters choose to run their Society in the interest of some such political or economic creed, as is done in Germany or Russia, but on the basis of absolute freedom of opinion in the search for truth, which characterizes all truly professional and scientific organizations.

The reason, in my mind, that this confusion arises recurrently in the Society is due to the fact that 75 per cent of our members are in public service, national and state, and most of these men are engaged not exclusively in research, but directly in the administration of the laws and policies adopted by the voters as expressed by political parties. On this question the division is along the lines of those who hold to the opinion, as expressed, that it is impossible to secure

loyal administration of policies of an economic character unless the administrators hold the same opinions as are embodied in these policies. This argument is so plausible that it is apt to deceive many high-minded and honorable members of the profession. I believe it to be thoroughly false, and capable of wrecking any program so supported. Why?

The first fundamental error in this logic is the assumption that the execution of highly technical programs involving professional services, with all that this entails, depends more on emotions or points of view than it does on training and efficiency. Where such programs involve destruction or wrecking of existing procedures it is true that such a process can best be carried out by ruthless disregard for all constructive evolutionary procedure. This is the opposite of a democratic process and, like war, may have lasting effects quite different from what was intended. It is the result of intolerance and impatience, disregard (rather than appreciation) of human rights, and absolute confidence in one's own rectitude and sagacity, which characterizes the exercise of autocratic power the world over and throughout the history of man.

Constructive evolution, by contrast, is a process built on trial and error, founded on the experience of the past and consideration of *all* elements affected by proposed changes, conducted by deliberate processes and prolonged unrestricted discussion, and finally, entrusted for its execution not to rabid partisans whose chief qualifications are their opinions, but

to those best trained in all the intricacies and skills of administration to execute the plans economically and efficiently.

The second fundamental error in this logic is the assumption that adherence to a political party sponsoring the program is more important than a career or merit system of administering public business. This premise does not coincide even with the first assumption. Convictions to amount to anything, must be independent of material considerations such as employment or emoluments, otherwise they cease to have value, and a man's "conscience" is for sale to the highest bidder, his vote purchasable, and his loyalty dependent entirely on value received. To be consistent, such "loyalty" must and in fact does, put service to the party organization ahead of any considerations of honest or efficient administrative performance. The idea is "security," that is, to be taken care of by an organization as such, to which in turn one gives his support, regardless of other considerations. Patronage retains its grip on public service entirely on this basis, and I have never yet observed a situation in which the false assumption is made by theorists of the need for idealistic loyalty that did not directly play into the hands of the patronage seekers and elevate partisan politics above the public interests.

But there is a third fundamental error which demands attention and exposure by professional men. This consists of the false principle of seeking increased efficiency in budgetary and administrative lines through concentration of executive control over both these lines, by a system of political appointments to all important key positions and, unless or to the extent thwarted by Civil Service rules, to all subordinate jobs as well. The increasing responsibilities of government, leading to greater burdens of taxation, as a matter of cold fact have been seized upon by political leaders, some honest and some quite otherwise, to wipe out all

systems of checks and balances formerly secured by state appointive boards, and to make every head of a department directly responsible to the party in power for his job. How well this plays into the hands of those advocating objectives one and two above is obvious. Again, this plan receives enthusiastic support from armchair theorists, too apt to be lawyers or professors, and is the chief glory of a caste known as efficiency experts, usually called in to give color and sanction to the plan among the more intelligent citizens. The principle of the clean sweep, of radical and drastic action, which is expected to have the immediate effect of reducing taxes, is here illustrated—and also the results, unexpected by the idealists but cynically anticipated by the practical politicians who are always the most enthusiastic supporters of the plan. No one is more surprised than the idealists when, after such a system is riveted on the state, it is found that costs rapidly increase, efficiency diminishes, and worthwhile idealistic programs are wrecked, discredited, and abandoned by withdrawal of public support and refusal of public funds for their continuance. It is by such routes that autocrats of the most contemptible public and private character rise to power to debauch the standards of public morality for a generation.

How does such concentration of power actually work and what is the alternative? The results when a venal, politically minded individual gets control are obvious. But supposing the chief is sincere, honest, and determined to secure a good administration. His inevitable tendency, then, is to distrust his subordinates. He may employ paid agents to spy upon his staff, install dictaphones, tap telephone wires, shadow suspicious characters within and without his organization and has even been known to sanction the tampering with and censorship of the mails, for the end justifies the means, of course. He also tends to concentrate in his own per-

son the final responsibility for decisions in cases of progressively smaller and smaller importance or detail. When the burden of this can no longer be borne by flesh and blood he delegates this immense power to "trusted" subordinates in his office who possess as little knowledge of field conditions, technical problems, local sentiment, customs and practice, and emergency demands, as he has himself. An increasing proportion of the time of all administrative men is now taken up with the purely unproductive paper work involved in making detailed reports demanded by the conscientious head or his equally meticulous assistants in order, after months of delay, to render decisions which are increasingly capable of error. Such a system lost France her American colonies, and it works no better today than it ever has. Does it increase field efficiency? Just the reverse. An attitude of contempt and disloyalty is bred which strikes at the very root of efficiency. All subordinates from the top down become buck passers and adepts at coloring reports on the basis of what such a report should show, regardless of actual facts. Constructive criticism disappears. No one sticks his neck out. Enterprising and able individuals resign and seek private employment and the morale of the whole organization is destroyed. One of the remarkable characteristics of such a system is the frequency with which the supposed excellence of supervision falls down and gross scandals develop under the nose of the autocrat. Where it becomes, as it does in such a vicious system, a contest of wits to see who can out-smart the other, the odds are with the many, and by various well-known methods of sogering, sabotage and bribe taking, influence, favoritism, and other means, the "political" employees display the fact that their "loyalty" is first to themselves, second to the party, and last and least to the job and the public.

In marked contrast to this process of deterioration we have the democratic

method of organization. The fundamental basis of this system is the presumption of honesty, integrity, and loyalty extended to all members of the service. The democratic system encourages constructive criticism, new ideas, changes in method, and downright hard work, enthusiasm for the job, courtesy to the public, a minimum of paper work and a maximum of constructive effort. Respect for the individual takes the place of suspicion and spying. Reasonable, adequate and thorough inspection on a constructive, educational, and cooperative basis insures the detection of incompetence or dishonesty, and a merit system removes the protection from insolent and defiant political appointees.

The direct result of this combination of career service and decent human relationships is the progressive decentralization of the organization by imposing increasing responsibility upon subordinates in making decisions in administrative dealings with the public. This in turn cuts out delays, greatly increases the chance for sound decisions, and insures public support. It is the exact reverse of local favoritism reinforced by political influence, which poisons an administration at its source and engenders a cynical public distrust of government agencies and functions.

Any plan of reorganization, be it state or national, which tends to destroy this democratic system of merit and decentralized responsibility and substitutes the spurious doctrines of party loyalty and concentration of authority is bound to fall by its own weight, carrying with it the past achievements attained under the better plan. It takes some straight thinking to detect these fallacies, but fortunately, the lessons of experience can be learned, at least by professionally trained thinkers, whose chief contribution to the science of government must continue to be in the substitution of practical, factual principles of public administration for those based on emotion, mob psychology and impatience with the fundamental processes of democracy.

THE EXTENSION FORESTER AND WILDLIFE CONSERVATION¹

By I. T. BODE

Missouri Conservation Commission

In a sense, the article that follows is unusual. It is not a description of methods, a report of new findings, or a discussion of administrative procedures. It is merely Mr. Bode's analysis of the job he is doing. It is really too bad that more men in the various technical services of the government do not take sufficient time to analyze their job, define its objectives, and clarify its technical, social, and economic implications. If this were done it is not unlikely that our everyday tasks would take on new meaning and added significance.

IN considering the most helpful way to present certain viewpoints regarding possibilities of coordinating wildlife conservation with extension forestry, it seemed that a preliminary clarification could best be made by summarizing my own analysis of the job I am undertaking as Extension Biologist. It has been my desire to arrive at an intelligent and sound approach. The following is a brief summary of that analysis.

1. It seems to me that all of the present day agitation and commotion over laws, regulations, good and bad game commissions, too much or not enough restriction, trespass nuisance, and other matters relating to wildlife must mean a rather intense interest on the part of a rather large group of people in our country. As I ponder this interest, it seems more and more evident that it is of a kind that arises from something more fundamental than promotion and propaganda. I believe, therefore, that I am working with something in which a large majority of the people are vitally interested.

2. Looking back over the history of nations, I am convinced that when opportunity to enjoy and use wild birds and animals, fish and other products of Nature disappears the people become impoverished, and the appreciation of the few remnants remaining becomes intense.

What little may be left of the wild, comes to be regarded in the eyes of that people with a sense of almost religious worship. It seems, therefore, that the thing I am working with is fundamental in human welfare, and that one can make the appeal for its conservation and restoration on the basis of human benefit.

3. The problem facing me deals with a resource that demands use of land for its preservation and restoration. Therefore, it comes into conflict with other interests which likewise require such use. "Conflict" in this case should not connote controversy but should be interpreted to mean simply the coming together of interests in a common field. If this be true, it seems evident that success will most probably lie in the degree to which I can, (1) fit in my own work with other interests, and (2) assist in bringing about more intelligent thinking and classification regarding the integration of *all* land use practices.

4. I am dealing with an essential land resource, the demand for which is increasing and, apparently, will never be over-supplied. Therefore, I have confidence that I can advocate the building up of this resource without complicating surpluses and their attendant problems. Over-population of wild species does occur, of course, under certain situations.

¹Presented at the Forestry Section of the Central States Regional Extension Conference at Iowa State College, Ames, Iowa, March 27, 1937, at which time Mr. Bode was Extension Biologist with the U. S. Extension Service.

The statement as made here relates to the situation as a whole.

5. I am dealing with a land resource the history of which has demonstrated its aesthetic, social, and former economic values, and one which has in it potential future economic value the full significance of which is only beginning to be "re-appreciated." Therefore, in this day of intense thought as to most efficient uses for land, I have a most logical suggestion for using at least the marginal and waste areas. This is true especially from the standpoints of *research* in land management and *trial* practice. There is as yet a question as to how far one may go in advocating game crops as "money-making" ventures for landowners, but one need not hesitate to make trials toward this type of use, especially with the objective of helping to round out or add to present returns already being realized from the land.

6. In the light of this reasoning, so far as my educational program is concerned, the logical approach seems to be as follows:

a. The placing of primary emphasis at this time on the esthetic, recreational, social, and indirect economical values.

b. Approaching primary or directly economical values, for the time being, on the basis of trial and careful procedure; avoiding premature promises of primary economic returns and possibilities.

c. Planning all approach on the basis of integration with other land use practices, acknowledging the wildlife resource as only a part of the entire picture of land use.

I have, therefore, no apologies to offer and feel no timidity in saying to you, as another group dealing with land use, that wildlife resources will be found ultimately to be an essential part of your planning as forest managers.

With these preliminary thoughts in

mind, no doubt we can further understand each other more clearly if our attitudes are explained. In considering these remarks, please do not assign to any of them the motive of attempting to initiate controversy, but accept them as having the objective of initiating constructive thought.

I am separating these attitudes into: (1) general attitudes regarding wildlife problems, especially those concerning game species, and (2) my own attitude regarding forestry aspects as they relate to wildlife.

While state or federal laws give possession of wildlife to the states or federal government, I believe we must recognize that a large part of the responsibility for actual preservation, restoration, and production in the quantities we desire rests with the private farmer and land owner. There is some possibility for conservation and restoration on publicly owned lands, of course, but I believe no one doubts the fact that this will never be adequate to meet the full demand.

If the above is correct, then we must face certain situations. First, farmers' rights with regard to private property and ownership must be respected by any who wish to make use of wildlife resources in any form on those properties. Second, the farmer himself enjoys the use of wildlife as much as anyone, and by virtue of provisions in most state laws, he has the right to that use without payment of special license fee. At the same time, by virtue of funds made available through license fees paid by others, he does receive assistance, a degree of protection, and availability of wildlife crops. Therefore, he should expect to share the wildlife resource with others. Third, any solution with regard to adequate production of wildlife resources will necessitate a cooperative understanding between the man producing the resource and the man who wants to use it, and this will not be

brought about by measures which engender conflict and controversy.

Now, as to my own attitude with regard to certain forestry aspects relating to game and other wildlife species:

Wildlife is an integral part of land use, and the public is demanding that it be so recognized regardless of our own special interests or ideas. Therefore, any broad program of land use must give consideration to this public interest. This is particularly true with forest lands. On the other hand, with certain exceptions on special areas, wildlife is only a part of land use, and the wildlife manager must in turn integrate his activity with other practices and requirements.

In the future, a very large part of farm and land use planning, including extension specialists' programs, is going to be on the basis of studies of the land's producing-possibilities *as related to other factors such as markets, social groups and interests, distribution facilities, and balance between production and possible consumption*. There will be less and less of the type of planning which conceives of a certain program or type of production as being good for the locality and attempts thereafter to superimpose the supposed benefit, regardless of these other factors. Therefore, one of the best accomplishments in wildlife conservation can come through incorporation of wildlife planning in farming practice, pasturing, forestry, erosion control, and other commonly accepted forms of land use.

There have been many pages written and many opinions expressed, and there has been a great deal of superficiality, in considering the forest-wildlife relationship. I speak frankly to you as foresters. Much has been said about forests automatically encouraging game and wildlife and how game and wildlife management has been made a part of forestry practice, but we must all admit that a lot of forest areas do not produce game, and that a

forest, just because it *is* a forest, is not automatically a wildlife producing area. Whether it *should* produce *game* or *trees* is another question entirely, and my purpose here is not to discredit forest production as a primary consideration but simply to emphasize the fact that a forest is not a wildlife producing area without intelligent provision for wildlife species the same as for trees and wood crops.

There are places where I believe the extension forester can justifiably give consideration to wildlife.

How many of you, when you look over a farm woodland with the forester's eye, actually make an analysis of it to determine: its best, honest, advantageous, producing-capacity as tree land; what the farmer actually does with woodlands; what crops he has a reasonable possibility of using; what parts of land utilization, besides tree planting and raising of wood supplies, really belong in the planning and management of that forest area? In other words, I believe the extension forester should think through carefully the full use of forest lands and should include in their management such supplementary things as will enable them to serve the greatest needs of various sorts. And, I do not believe he needs to retrograde as a forester in any sense to do that.

Extension forestry, the same as every other branch, is trying to enlist interest in its own program. I wonder if it would not be sound thinking for the extension forester to consider the possibilities of gaining greater support for forestry by including in his farm forest planning other interests in addition to production of wood supplies?

I believe the forester should and will very soon recognize and acknowledge that he has areas in his forests and woodlands, and that there are other uncultivable and non-pasturable areas, upon which he had just as well quit trying to grow tree crops.

No doubt all of you have had the experience of making repeated attempts at planting and developing tree crops on certain sites where there is very little opportunity or hope of any ultimate success. I wonder if areas such as these are not of the kind upon which game cover can be produced and through which wildlife management can become a part of forestry practice?

I believe that, with some thought given to it, every farm woodland can find a place for wildlife and every extension forester can encourage wildlife production with only slight modification of regular teaching or practice. Consider, for example, the work in "Timber Stand Improvement," which is an important part of a great many extension forestry programs. As explained by one forester, it is not, in his opinion, economical to spend much time on the border strip of a farm woods, because light and other ecological conditions are such that timber production in this border strip never amounts to much. It may be, in fact, that to leave this outside border to grow up into a heavy undergrowth will be decidedly to the advantage of improvement work done on the interior of the woods, by maintaining more satisfactory shade conditions. Would it not be possible for the forester, then, at the time of a timber stand improvement demonstration, to call attention to the value of this strip for wildlife production and to reverse his usual process by showing how the favoring of fruit and nut-bearing species and of low growing protective cover and nesting sites in this strip will be to the advantage of wildlife? These marginal or peripheral areas are some of the best we have for wildlife production.

Another consideration that, to me, seems justifiable is that of preserving fruit and mast-bearing trees for food, and den trees for nesting of animals and birds. Having been trained as a forester myself, I can

appreciate fully the problems you men face in this regard, and I do not want to be understood to be advocating the sacrificing of good timber development. But, I do feel that, if the wildlife interest were kept in mind, there could be found many places where a fruit-bearing tree or a nut tree or a hollow "coon tree" could be left in the forest stand with very little ultimate damage to the final product. To me it does not seem necessary, even in good forestry practice, to eliminate all such trees just because they are not of the species of the main stand or because they are dead. I am making a plea, therefore, for consideration of the possibilities of leaving a percentage of such trees scattered throughout forest areas.

As another example of how the forester may help wildlife in his regular program, there comes to mind tree planting for erosion control. We all, down in our hearts, recognize that there are certain areas where trees are not the whole solution to control and where tree planting must be supplemented with grasses and shrubs. It would seem, that, under such conditions, a sound plan would point the way to include adequate areas of grasses and shrubs which would combine with the trees to control erosion, produce wood crops, and at the same time harbor wildlife.

As a final thought I raise this question. In view of the tremendous increase in interest in wildlife, has not the time arrived when research work should be underway on a fairly substantial basis, looking toward modification of commonly accepted silvicultural practices which will be just as acceptable from the timber production standpoint and at the same time be much more favorable for wildlife than are some of our present practices? I cannot feel that we have finished our exploration in the field of the best combined use of forest lands.

My final plea to each forester is to think of wildlife as a part of his general conservation activity and to view his forests as ecological units the production possibilities of which may run beyond the wood material itself.

It would be unfair if I did not make clear my recognition of the fact that for-

esters *have* given attention to practically all of the points brought up in this discussion, and that they have not been indifferent. Perhaps my purpose can best be expressed as a desire to emphasize recognized considerations rather than an attempt to bring forth any new thoughts or ideas.



ORIENTAL CHESTNUT TREES

CHESTNUT trees of Chinese and Japanese origin, which show promise of resistance to both blight and "ink" disease, may partially fill the gap left in eastern forests when the American chestnut was all but erased by the destructive work of these two diseases.

Within the last 10 years the U. S. Department of Agriculture has brought large quantities of chestnut seed into this country from eastern Asia, mainly selected from strains or varieties thought to have superior qualities of disease resistance as well as good size and quality of nut. In the last seven years more than 200,000 young trees grown by the department from imported seeds have been planted by various federal, state, and private agencies.

To some extent the Asiatic chestnut trees are lacking in hardiness and erectness, as compared with the American chestnut tree. In order to combine the resistance to disease, large size of nut, and certain other desirable characteristics of the Asiatic species with the hardiness and habit of growth of the American, hybrid forms are now being produced by department breeders. Since 1925 more than 3,000 hybrid trees have been grown. The earliest have already begun to bear, and have been used in making second- and third-generation crosses. The species used include various strains and varieties of American chestnut, both native tree and shrub chinquapins, the Chinese chestnut, Chinese timber and dwarf chinquapins, and various wild and cultivated forms of Japanese chestnut.

FORESTRY IN OUR CONSTITUTIONS

By JOSEPH S. ILLICK

New York State College of Forestry

Colorado was the first state to place forestry in an American constitution. In 1876 three forestry provisions became a part of her original constitution. Thirteen years later (1889) North Dakota provided for a state forest school in her original constitution. Only five states had constitutional provisions for forestry at the turn of the last century. Since then ten other states have included a wide range of forestry provisions in their constitutions. Effective July 1, 1937, Missouri adopted a self-enforcing constitutional amendment of approximately 600 words covering the general field of conservation including forestry. Dr. Illick has made a complete compilation of forestry provisions in state constitutions. He quotes and interprets some of the most significant of these constitutional provisions, and sets forth the principal administrative advantages and disadvantages of placing forestry provisions in constitutions. He emphasizes the immediate and pressing need for more and better research in the field of forest administration. Without special studies and comparative surveys the existing weaknesses of forest administration will continue; with them enduring administrative foundations and frameworks can be designed and developed.

THE year 1937 marks the sesquicentennial of our federal constitution. It will go down in history as a year of important constitutional discussions and decisions. With constitutional matters in the forefront of public discussion, it seems both timely and pertinent to review the contents of our constitutions with special reference to forestry and other conservation provisions.

The word "forestry" does not appear in our federal constitution, nor are any specific forestry provisions included in this supreme law of the land, which Gladstone called "the most wonderful work ever struck off at a given time by the brain and purpose of man". And yet without the use of the word forestry or the inclusion of any specific forestry or conservation provisions, ample authority is given to our federal government under the public welfare and national defense provisions of the constitution for the development of forestry and other conservation activities.

In the absence of any provision for forestry in our federal constitution, a consideration of "Forestry in Our Constitutions" is necessarily limited to state constitutions. In approaching this subject it is essential to recall that the American state is a peculiar organism, unlike anything in modern Europe or the Ancient World.

The cantons of Switzerland are its only parallel in governmental organization. We must, therefore, not look elsewhere for examples and experiences with forestry provisions in constitutions, for they do not exist.

A series of administrative studies in forestry carried on by the writer during the past five years is bringing forth many interesting facts and interpretations. Among these is the significant fact that not less than fifteen state constitutions contain one or more provisions pertaining to forestry. These fifteen states and the year when their first constitutional provision for forestry was adopted are: Colorado (1876), Montana (1889), North Dakota (1889), New York (1894), Utah (1896), Michigan (1909), Wisconsin (1910), New Mexico (1912), Ohio (1912), Minnesota (1914), Texas (1917), Massachusetts (1918), Louisiana (1921), California (1926), and Missouri (1937). These records show that state constitutions were in operation in this country for approximately 100 years before any forestry provision was included in them. Colorado led the way in 1876, followed by Montana and North Dakota in 1889, New York in 1894, and Utah in 1896. These five states were the only ones with forestry provisions in their constitutions at the turn of the cen-

tury. The other ten states followed in irregular order, Missouri being the last with her constitutional provision for forestry going into effect as of July 1, 1937.

COLORADO FIRST STATE TO PLACE FORESTRY IN CONSTITUTION

In the original constitution of Colorado, adopted March 14, 1876, forestry made its first appearance in any American constitution. The three sections relating to forestry are:

Article IX, Section 9.—The state board of land commissioners shall be composed of three (3) persons to be appointed by the governor, with the consent of the Senate, who shall have the direction, control and disposition of the public lands of the state under such regulations as are or may be prescribed by law.

Article XVIII. (Miscellaneous).—Section 6. The general assembly shall enact laws in order to prevent the destruction of, and to keep in good preservation, the forests upon the lands of the state or upon lands of the public domain, the control of which shall be conferred by Congress upon the State.

Section 7.—The general assembly may provide that the increase in value of private lands, caused by the planting of hedges, orchards, and forests thereon, shall not, for a limited time, to be fixed by law, be taken into account in assessing such land for taxation.

These three constitutional provisions have now been a part of the Colorado constitution for more than 60 years. During this time the control of state forestry has bounded back and forth between the Board of Land Commissioners and not less than three other state agencies. The first year after their adoption the state legislation directed the State Board of Agriculture to gather information on forest culture, but not until nine years later (1885) was any special state agency set up to handle forestry matters. That year the Office of Forest Commissioner was created. It functioned only for six years, and then forestry remained dormant until 1911, when a State Board of Forestry was established with power to appoint a State Forester. This administrative setup continued until 1933, when the Office of State

Forester was abolished, and since then the Board of Land Commissioners has had full charge of state forestry work "with power to appoint a state forester if necessary and economically feasible". It is significant that at no time during these administrative changes did the Board of Land Commissioners, first set up by the original state constitution of 1876, relinquish its administrative control of state lands, land exchanges and timber sales. Even during the 22-year period (1911-1933) when the State Forester served under the State Board of Agriculture, he also served as consulting forester to the Board of Land Commissioners.

In evaluating the influence and results of these three Colorado constitutional provisions it is important to realize that they differ widely in nature and application. Article IX, Section 9 is *self-enforcing*, Article XVIII, Section 6 is *directive* in nature, and Section 7 is *permissive*. Section 6 directs that the general assembly *shall* enact laws to prevent forest destruction, while Section 7 suggests that the general assembly *may* grant tax exemption for a limited time on privately owned forest land. The latter two sections occur near the end of the constitution under the general heading of "Miscellaneous" provisions. Presumably the framers of this constitution were uncertain as to the proper place of forestry in a state government setup, and consequently they grouped these two forestry sections with other miscellaneous provisions.

At the time Colorado included these forestry provisions in her original constitution a wave of enthusiastic support for forestry was sweeping across our country, especially the Midwest and the Far West. Within five years of their adoption (1876) the first forestry association in this country was formed at St. Paul, Minn., the first arbor day was celebrated in Nebraska, the timber culture act was passed, the first appropriation (\$2,000) for federal

forestry was made, the first federal forestry agent was appointed, and the U. S. census for the first time included a survey of forest resources. And it was also within this brief period that Dr. Franklin B. Hough presented his historic forestry paper on "The Duty of Governments in the Preservation of Forests" at a meeting of the American Association for the Advancement of Science at Portland, Maine. All these developments brought forestry into the forefront of public discussion, and it is not difficult to see why the people of Colorado chose their original constitution as the official instrument for expressing and recording their will in forestry matters, for it had then already become a custom to include in state constitutions whatever matters people were greatly interested in at the time. It was unquestionably more practicable to include these three forestry provisions in the state constitution than to subsequently go through the process of enacting separate laws covering each of them. It seems fair to say, however, that these forestry provisions were placed in the constitution as a matter of convenience and expediency rather than as an act of sound governmental procedure based on deliberate administrative judgment, for more than a half-century of experience has shown conclusively that these constitutional provisions have not produced any more favorable results for forestry in Colorado, than if the same or similar provisions had been placed into ordinary laws.

UTAH ALSO PLACES FORESTRY PROVISIONS IN HER CONSTITUTION

It is noteworthy that the influence of these Colorado provisions extended beyond the borders of the state, for they furnished the basis for almost identical forestry provisions in the original constitution of Utah adopted in 1896. Under the general title of "Forestry", Article XVIII, Section 1, appears a provision

that is almost a verbatim reproduction of Article XVIII, Section 6 of the Colorado constitution of 1876. It directs the state legislature to enact laws that will preserve the forests on the lands of the state. In less than three months after its adoption a law was passed authorizing the State Board of Land Commissioners to sell timber from unsold, unleased, and unreserved lands, provided that no contract of sale should entitle the purchaser to cut, use, injure or destroy trees under eight inches in diameter at the butt, except of certain named species, and required such disposal of the brush as was necessary to protect young timber from fire. The same act directs the land commissioners to reserve from sale such timberlands as they deem necessary to preserve the forests of the state, prevent a diminution of the flow of rivers and aid in the irrigation of arid lands.

NORTH DAKOTA CONSTITUTION PROVIDES FOR A STATE FOREST SCHOOL

Thirteen years after Colorado led the way in placing forestry provisions in her constitution, North Dakota followed by including in her original constitution of 1889 a provision (Article XIX, Section 216) for a school of forestry to be located in one of the counties of McHenry, Ward, Bottineau, or Rolette. As a result of an election in November 1894 the school was permanently located at Bottineau in Bottineau County. In 1897 a law was enacted naming the school "The North Dakota School of Forestry". The first school building was erected in 1906 by the citizens of Bottineau on land donated by the state. The North Dakota School of Forestry is still in operation. It is not rated as a professional forest school, but is organized as a junior college and offers a preforestry course covering a two-year period. It is noteworthy that the first formal state action in America creating a separate school of forestry

was taken by North Dakota in her original constitution of 1889. This was nine years before the first professional forest school in the United States was established at Cornell University.

MONTANA PROVIDES FOR FOREST LAND CLASSIFICATION

The same year (1889) that North Dakota authorized her state forest school, Montana through a special constitutional provision, also a part of her original constitution (Article XVII, Sections 1 and 2), provided for the disposal, classification and administration of her public lands in the following language:

Said lands shall be classified by the Board of Land Commissioners as follows: First, lands which are valuable only for grazing purposes. Second, those which are principally valuable for the timber that is on them. Third, agricultural lands. Fourth, lands within the limits of any town or city or within three miles of such limits. . . . The lands of the second class may be sold, or the timber thereon may be sold, under such rules and regulations as may be prescribed by law.

Later in the same constitution (Article XIX, Section 3) the legislature is directed

to enact suitable laws to prevent the destruction by fire from any cause of the grasses and forests upon lands of the state or upon lands of the public domain, the control of which may be conferred by Congress upon this state and to otherwise protect the same.

MOST CONTROVERSIAL CONSTITUTIONAL PROVISION IN FORESTRY

Article VII, Section 7 of the New York constitution of 1894 is the most controversial forestry provision in any state constitution at the present time. It has been fought and refought again and again. The text of this highly controversial provision is:

The lands of the state now owned or hereafter acquired constituting the forest preserve as now fixed by law, shall be forever kept as wild forest lands. They shall not be leased, sold or exchanged, or be taken by any cor-

poration, public or private, nor shall the timber thereon be sold, removed or destroyed. . . . A violation of any of the provisions of this section may be restrained at the suit of the people or, with the consent of the supreme court in appellate division, or notice to the attorney-general at the suit of any citizen.

This constitutional provision became effective in its original form on January 1, 1895. Hardly had the recording ink become dry until strong and continuous opposition developed. As early as 1897 and again in 1898 the state forest commission attempted to overthrow this ultra-restrictive provision and open the way to the practice of forestry. Successive governors, conservation leaders, and prominent foresters (among them two former chief foresters of the U. S. Forest Service) have repeatedly thrown their power and prestige against this absolute no-cut constitutional provision. The defense lines of the extreme protectionists, however, have withstood these repeated attacks for more than 40 years.

The proponents of this measure maintain that the forest preserves are now and will continue to be of the greatest service to the people of New York State if kept in a natural wild condition. They think of these forest preserves as a refuge, a natural sanctuary, a holy place. They must not be spoiled by man in any way at any time. The more enthusiastic proponents maintain that "We must not permit the sale or exchange of one acre of this land. . . . We must not permit the selling of a single tree or branch of it. . . . This forest preserve is priceless as a place for seeking, finding, and preserving health, regulating streamflow and conserving water."

The opponents of this provision are equally strong in their convictions that the present forest preserve policy is administratively unwise, economically wasteful, technically unsound, and socially unnecessary. They maintain that a much smaller area of wild forest land would

adequately serve the people of the state. In support of their point of view they tell us that the forest preserves of New York State now total 2,389,510 acres, of which 2,159,795 acres are in the Adirondacks and 229,715 acres in the Catskills. In the aggregate they cover an area greater than that of the Yellowstone Park, the largest of our National Parks. In 1921 Governor Miller in his message to the legislature recommended the opening of the forest preserve to provide better protection, prevent wood waste, improve forest conditions, and provide revenue. In recent years the revenue-producing possibilities of the forest preserves have been stressed, but it appears as if the original framers of this forestry provision gave relatively little weight to the revenue argument. This may be explained by the fact that in 1894, when this provision was adopted, the state had no debt whatever. Instead, there was a balance of \$1,600,000 in the state treasury at the beginning of that fiscal year, and a state capitol had just been built at a cost of \$20,000,000 and an additional \$2,000,000 was spent in purchasing the small Niagara Falls Reservation.

The constitutional provision of 1894 has been modified somewhat by amendments, most of them authorizing the building of new highways or the re-location of old ones. Another amendment permits the legislature to provide for the use of not exceeding three per cent of such lands for the construction and maintenance of reservoirs for municipal water supply, for the canals of the state, and to regulate streamflow.

Opinions of several attorney-generals of the state have helped to interpret the meaning of this controversial constitutional provision and thus determine permissive and non-permissive forest practices. These opinions hold that dead trees cannot be removed for aesthetic reasons alone, that artificial reservoirs may

be constructed provided procedure is in accord with conservation laws, that highways can be constructed on existing rights-of-way but no new highway routes can be developed without special constitutional authorization, and that the right of the state conservation department to build closed shelters and furnish human food at cost in remote sections of the forest preserve is doubtful. In 1927 the attorney-general ruled that planted trees in the forest preserves can "be pruned and thinned insofar as good forestry requires it", and in 1933 an opinion was given stating that reasonable cutting and removal of timber for the building of roads necessary for the protection of the forest preserves from fire is not a violation of this provision and may be done, when "such destruction is not to any material degree." A year later (1934) the state conservation department was officially advised by the attorney-general that the construction of ski trails with a minimum of timber removal was permissible, where "such trails will increase the use of land for their true purpose without affecting their true natural character."

In 1929 the State Legislature passed a law authorizing the Conservation Commissioner to construct and maintain for the use and pleasure of the public a bobsleigh run or slide on state land in the forest preserve. The contemplated slide would have been somewhat more than a mile in length and approximately sixteen feet wide. The number of trees required to be cut in its development would have been relatively few. A suit was instituted to determine the validity of this law, and in 1930 the Court of Appeals held that this act was unconstitutional and in violation of Article VII, Section 7 of the State Constitution.

These legal opinions offer ample proof that this constitutional provision continues to be highly controversial, a fact generally admitted by those who are familiar with

its origin and development. That this constitutional provision (Article VII, Section 7) has provided a safeguard for the forest preserves that would not have been provided by an ordinary law is most certainly true. That it has prevented the full development of this vast and valuable forest area is equally true. It seems certain that this extremely controversial provision will be considered again in a formal way by the constitutional convention called for 1938.

OTHER CONTROVERSIAL AND RESTRICTIVE PROVISIONS

About 1830 a wave of popular demand for public improvements swept all over our country. State after state indulged heavily in the construction and maintenance of canals, railroads, and other internal improvements. To promote these improvements required enormous sums of money and resulted in heavy borrowing by the states. These debts in time became very burdensome and there developed an unfavorable public reaction toward internal improvements in general. Something had to be done to curb improvident legislatures in making rash financial experiments. The people had lost faith in their state legislatures, so they turned their attention to state constitutions with the hope that these documents could be drawn up or amended in such a way as to curb excessive expenditures. As a result of these deliberations many states adopted specific constitutional provisions limiting their outstanding debts to a fixed amount and placing absolute restrictions on all internal improvements. Michigan and Wisconsin are excellent examples of such states. Their original constitutions declare in most positive terms that the state shall not be a party to, be interested in, nor contract any debt for internal improvements. This provision raises at once the all-important question if forestry is or is

not an internal improvement. In 1915 the supreme court of Wisconsin decreed that forestry was an internal improvement and that the entire forest reserve policy of the state was unconstitutional. This interpretation put forestry in Wisconsin practically at a standstill, and for a time the state's whole forestry program was hanging in the balance. Five years earlier (1910) a constitutional amendment was ratified by the people of Wisconsin permitting the state to appropriate money

for the purpose of acquiring, preserving, and developing the water power and the forests of the State, but there shall not be appropriated . . . in any one year an amount to exceed two-tenths of one mill of the taxable property of the State as determined by the last preceding State assessment.

This amendment of 1910 having been favorably acted upon by two successive legislatures and approved by the people by a majority of nearly 17,000 should have cleared the way for forestry, but the Supreme Court in 1915 held that this amendment was invalid because the vote thereon was not recorded in the journal of both houses as required by the constitution. This adverse decision practically wrecked a forestry program that had been in the making for more than twenty years, during which period state forest reserves aggregating approximately 365,000 acres had been built up. The State Board of Forestry was left practically without functions, except the protection of forest land, and as a result it was abolished, and such duties and responsibilities as were left, were assumed by the newly created state conservation commission. After this serious setback of 1915, progress in forestry was attempted in every permissible way, but chiefly in the field of forest protection. It was not until 1921 that efforts were again put forth to correct this deplorable constitutional situation. That year a constitutional amendment was approved by the

state legislature to the effect that the state might appropriate money for the purpose of acquiring, preserving, and developing the forests of the state, not exceeding, in any one year, an amount equivalent to two-tenths of one mill on the taxable property of the state. This amendment, substantially the same as the one of 1910, was approved in 1923 and ratified by the people by a majority vote of nearly two to one in 1924. Soon thereafter the Supreme Court held this amendment to be constitutional, but no specific use was made of it until March 1, 1930 when by legislative action \$298,797.62 became available to the conservation commission for the acquisition, development and protection of the forest areas of the state. Intermittently since then, advantage has been taken of this special constitutional provision.

Among the other states that have sought relief from rigid financial restrictions in their constitutions are Michigan and New York. In 1909 Michigan amended her constitution to permit the expenditure of state funds for reforestation and forest protection and in 1929 New York adopted a constitutional amendment permitting the state to contract debts beyond the amount fixed by the constitution "to suppress forest fires."

ENCOURAGEMENT AND TAX RELIEF PROVISIONS

In strong contrast to the foregoing restrictive provisions, many of which have already been modified or eliminated, there gradually are appearing in our constitutions a considerable number of encouragement and relief provisions in forestry. These provisions usually take the form of providing technical assistance, financial subsidy, taxation adjustment or even tax exemption. As early as 1876 the Colorado constitution provided that the increase in value of private lands caused by the planting of forests thereon shall not be

taken into account in assessing such land for taxation. Since then six other states (California, Louisiana, Massachusetts, Minnesota, Ohio, and Wisconsin) have added provisions to their constitutions regarding forest taxation, the encouragement or reforestation and the promotion of forestry in general. Among these provisions are:

Ohio (Article II, Section 36).—Laws may be passed to encourage forestry, and to that end areas devoted exclusively to forestry may be exempted, in whole or in part, from taxation.

Louisiana (Article X, Section 1).—For the purpose of encouraging the reforestation of denuded lands, contracts fixing the assessed valuation of the specific lands for the duration of the agreements are hereby authorized under such regulations, terms and conditions as may be prescribed by law.

California (Article XIII, Sec. 12¾, as amended Nov. 2, 1926).—Fruit and nut-bearing trees under the age of four years from the time of planting in orchard form, and grape vines under the age of three years from the time of planting in vineyard form, and all immature forest trees which have been planted on lands not previously bearing merchantable timber, or planted or of natural growth, upon lands from which the merchantable original growth timber stand to the extent of seventy per cent of all trees over sixteen inches in diameter has been removed, shall be exempt from taxation, and nothing in this article shall be construed as subjecting such trees and grapevine and forest trees to taxation; *provided*, that forest trees or timber shall be considered mature for the purpose of this act at such time, after forty years from the time of planting or removal of the original timber as above provided, as a board consisting of a representative from the State Board of Forestry, a representative from the State Board of Equalization, and the county assessor of the county in which the timber is located, shall by a majority thereof so determine.

Minnesota (Article XVIII, Section 1).—Laws may be enacted for the purpose of encouraging and promoting forestation and reforestation of lands in this state, whether owned by private or the public, including the fixing in advance of a definite and limited annual tax at or after the end of such term upon the timber and other forest products so grown, but the taxation of mineral deposits shall not be affected by this amendment.

Massachusetts (Article XLI).—Full power and authority are granted the general court to prescribe for wild or forest land such methods of taxation as will conserve the forest resources of the commonwealth.

The following extremely liberal tree planting subsidy was proposed in Minnesota in 1913 but failed of passage:

For the purpose of encouraging the planting, cultivation and protection of useful forest trees in this state, laws may be enacted providing for the payment by the state of an annual bounty of not more than two dollars and fifty cents (\$2.50) per acre, for a term, in each case of not more than ten (10) years, and not exceeding ten (10) acres, to any person who shall plant, cultivate and protect useful forest trees upon his own land.

A MANDATORY PROVISION

New York has the distinction of having in her constitution the largest number of important constitutional provisions for forestry, and they embody an extremely wide range of directive power. They range all the way from an absolute prohibitive provision (Article VII, Section 7) to a positive mandatory provision (Article VII, Section 16). The latter provision became effective January 1, 1932, and because of its unusual nature is quoted here in full:

The legislature in each of the eleven calendar years immediately following the adoption of this amendment shall appropriate out of any funds in the treasury not otherwise appropriated moneys for the acquisition by the state of land, outside of the Adirondacks and Catskill parks,

as now fixed by law best suited for reforestation, for the reforesting of the same and the protection and management of forests thereon; for the acquisition of land for forest tree nurseries, and for the establishment and maintenance of such nurseries, such appropriations to begin in the first year with the sum of one million dollars (\$1,000,000) and increasing annually by the sum of two hundred thousand dollars (\$200,000) to and including the sixth year and in each of the five years immediately following, a sum equal to that appropriated for the sixth year. All such appropriations to be available until expended. A law enacted pursuant to this section shall take effect without submission to the people.

The lands of the state, now owned or hereafter acquired, constituting the forest preserve as now fixed by law, shall be forever kept as wild forest lands. They shall not be leased, sold or exchanged, or be taken by any corporation, public or private, nor shall the timber thereon be sold, removed or destroyed. Nothing contained in this section or in the prohibitions of section seven of this article shall prevent the state from cutting, selling or removing the trees, timber, forest products and other materials or any lands hereafter acquired with the moneys herein authorized within the forest preserve counties but outside of the Adirondacks and Catskill parks as now fixed or hereafter extended by law.

The foregoing constitutional amendment was adopted with 778,192 "yes" votes and 554,550 "no" votes out of a total vote of 1,332,742. The extent to which the provisions of this mandatory amendment has been carried out to-date is shown in the following table:

| Year | Appropriation specified by constitutional amendment | Actual appropriation by state legislature | Area acquired ¹ (Acres) | Area reforested (Acres) | Aggregate area of reforestation area (Acres) ² |
|------|---|---|------------------------------------|-------------------------|---|
| 1929 | ----- | \$ 120,000 ³ | ----- | ----- | ----- |
| 1930 | ----- | 396,250 ³ | 9,583 | 5,411 | 7,477 |
| 1931 | ----- | 600,000 ³ | 36,835 | 15,885 | 25,963 |
| 1932 | \$1,000,000 | 1,000,000 | 52,792 | 17,771 | 27,909 |
| 1933 | 1,200,000 | 640,000 | 75,656 | 8,378 | 13,944 |
| 1934 | 1,400,000 | 400,000 | 36,117 | 30,060 | 51,551 |
| 1935 | 1,600,000 | 400,000 | 34,037 | 32,547 | 50,648 |
| 1936 | 1,800,000 | 400,000 | 43,597 | 43,060 | 67,214 |
| 1937 | 2,000,000 | 400,000 | ----- | ----- | ----- |
| | \$9,000,000 | \$4,356,250 | 288,617 | 153,112 | 244,706 |

¹Title transferred to the state.

²Includes natural forest growth on areas on which reforestation work is completed.

³Appropriations for reforestation prior to passage of reforestation amendment.

PROVISIONS FOR ADMINISTRATIVE ORGANIZATION OF FORESTRY

The constitutions of three states (New York, Louisiana, and Missouri) contain provisions for the administrative organization of their forestry work. The New York constitution does not go beyond numbering and naming the state department that shall handle forestry matters. Article V, Section II, specifies that there shall be twenty civil departments in the state government and that number eight is designated as "Conservation." Details pertaining to the organization and responsibilities of the department are a part of the conservation laws of the state.

The Louisiana constitution goes somewhat farther in that it not only names the Department of Conservation, but also sets forth its principal purposes and objectives, designates the title of its chief administrative officers, and directs the legislature to enact necessary laws in the following language:

Article VI, Section 1.—The natural resources of the State shall be protected, conserved and replenished; and for that purpose shall be placed under a Department of Conservation which is hereby created and established. The Department of Conservation shall be directed and controlled by a Commissioner of Conservation to be appointed as elsewhere provided in this Constitution, who shall have and exercise such authority and power as may be prescribed by law. The Legislature shall enact all laws necessary to protect, conserve and replenish the natural resources of the state, and to prohibit and prevent the waste or any wasteful use thereof.

Article VI, Section 2.—Forestry shall be practiced in the State under the direction of the Department of Conservation and the Legislature is authorized to make provisions therefor.

Missouri has the distinction of having in her constitution the longest (approximately 600 words) and the most detailed provision for forestry and conservation in any state. It is designated as constitutional amendment number four, submitted to the people of the state by initiative petition, ratified in November 1936, and became effective July 1, 1937. Because

of the recent adoption of this amendment, its comprehensive scope and unusual provisions it is quoted here in full:

The control, management, conservation and regulation of the bird, fish, game, forestry, and all wild life resources of the State, including hatcheries, sanctuaries, refuges, reservations and all other property now owned or used for said purposes or hereafter required for said purposes and the acquisition and establishment of the same, and the administration of the laws now or hereafter pertaining thereto, shall be vested in a commission to be known as the Conservation Commission, to consist of four members to be appointed by the Governor, not more than two of whom shall be members of the same political party. The commissioners shall have knowledge of and interest in wild life conservation. Vacancies shall be filled by appointment by the Governor for the unexpired term within thirty days from the date of such vacancy; on failure of the Governor to fill the vacancy within thirty days, the remaining commissioners shall fill the vacancy for the unexpired term. The first members of said commission shall be appointed for term, as follows: One for a term of two years, or until his or her successor is appointed and qualified; two for terms of four years, or until their respective successors are appointed and qualified; one for a term of six years, or until his or her successor is appointed and qualified. Upon the expiration of each of the foregoing terms of said commissioners a successor shall be appointed by the Governor for a term of six years, or until his or her successor is appointed and qualified, which term of six years shall thereafter be the length of term of each member of said Commission. The members of said Commission shall receive no salary or other compensation for their services as such. The members of the Commission shall receive their necessary traveling and other expenses incurred while actually engaged in the discharge of their official duties.

Said Commission shall have the power to acquire by purchase, gift, eminent domain, or otherwise, all property necessary, useful or convenient for the use of the Commission, or the exercise of any of its powers hereunder, and in the event the right of eminent domain is exercised, it shall be exercised in the same manner as now or hereafter provided for the exercise of eminent domain by the State Highway Commission.

A Director of Conservation shall be appointed by the Commission and such director shall, with the approval of the Commission, appoint such assistants and other employees as the Commission may deem necessary. The Commission shall determine the qualifications of the Director, all assistants and employees and shall fix all salaries, except that no commissioner shall be eligible for such appointment or employment.

The fees, monies, or funds arising from the operation and transactions of said Commission and from the application and the administration

of the laws and regulations pertaining to the bird, fish, game, forestry and wild life resources of the State and from the sale of property used for said purposes, shall be expended and used by said Commission for the control, management, restoration, conservation and regulation of the bird, fish, game, forestry and wild life resources of the State, including the purchase or other acquisition of property for said purposes, and for the administration of the laws pertaining thereto and for no other purpose.

The general assembly may enact any laws in aid but not inconsistent with the provisions of this amendment and all existing laws inconsistent herewith shall no longer remain in force or effect. This amendment shall be self-enforcing and go into effect July 1, 1937.

SPECIAL ADMINISTRATIVE PROVISIONS

Several states have provisions in their constitutions concerning the creation and management of school forests, state forests, and state forest reserves, and other specific forest policies and practices. In 1914, Minnesota added the following amendment to her constitution:

Article VIII, Section 7.—Such of the school and other public lands of the state, as are better adapted for the production of timber than for agriculture, may be set apart as state school forests, or other state forests, as the legislature may provide and the legislature may provide for the management of the same on forestry principles. The net revenue therefrom shall be used for the purposes for which the lands were granted to the state.

New Mexico in 1912 wrote into her constitution that "the police power of the State shall extend to such control of private lands as shall be necessary for the prevention and suppression of forest fires" and in 1932 added a provision authorizing the exchange of state lands within the National Forests for federal lands of equal value.

BROAD CONSERVATION PROVISIONS

Two states have broad conservation provisions in their constitutions. In 1912 Ohio adopted a constitutional amendment providing for the conservation of natural resources, the acquisition of forest reserves, and the control of forest taxation.

Five years later (1917) Texas adopted a rather lengthy constitutional amendment (approximately 375 words) providing for the conservation and development of all the natural resources of the State, including forest resources, the establishment of conservation districts, and the creation of such indebtedness as may be necessary to achieve the purposes of this amendment.

CIVIL SERVICE PROVISIONS IN CONSTITUTIONS

In addition to provisions pertaining primarily to forestry, modern state constitutions also contain a wide range of related provisions many of which have had a definite influence upon the development of forestry. None of these closely related provisions are of greater importance than those pertaining to civil service. New York led the way by enacting a civil service law in 1883, followed by Massachusetts in 1884. Since then about a dozen states enacted civil service laws, but now only nine states have civil service laws on their statute books, and in only four of these states (New York, California, Colorado, and Ohio) is the civil service based upon provisions in the state constitution. In 1894 New York led the way by transferring from her statute books into her constitution necessary provisions for a state civil service, these provisions having been enacted into law eleven years earlier. At present the New York constitution provides that "appointments and promotions in the civil service of the State, and all the civil divisions thereof, including cities and villages, shall be made according to merit and fitness to be ascertained, so far as practicable, by examination, which, so far as practicable, shall be competitive." In almost the same words Ohio in 1912 expressed the civil service principle in her constitution. In 1918 Colorado provided for the merit system in her constitution with the following provision:

Appointments and employments in the classified civil service of the State shall be made according to merit and fitness, to be ascertained by competitive tests of competence, the person ascertained to be the most fit and of the highest excellence to be appointed first.

Such civil service provisions, irrespective of whether they are in state laws, administrative codes, or constitutions, point the way to higher standards of personnel service in forestry as well as other administrative units of state government.

SUMMARY

The fifty or more forestry provisions contained in the fifteen state constitutions considered in this article include a lot of worthful information, and raise many pertinent questions for later consideration. Among these questions are: What are the advantages and disadvantages of having forestry provisions in constitutions? What kind of forestry provisions belong in constitutions? What influence have constitutional provisions had thus far on the development of forestry? Are forestry provisions in constitutions, as a rule, self-enforcing? To what extent and in what manner have legislatures complied with the permissions and directions pertaining to forestry set forth in state constitutions? Is the present trend in constitution revision towards including or excluding forestry provisions? Each of these questions is deserving of a full answer, but in this article, only a few summary statements can be added listing the main advantages and disadvantages of forestry provisions in constitutions, and include therewith the recommendations of a National Committee on State Government regarding forestry provisions in a model state constitution.

Based upon more than sixty years of state experience and experiment with forestry provisions in constitutions, the following advantages and disadvantages present themselves:

ADVANTAGES

1. Forestry provisions in constitutions express and record in a formal and superior way the public attitude toward forestry in general and toward specific forest policies and practices.

2. They give support and prestige to important forestry matters, for the constitution is generally regarded as the supreme law of the state.

3. They serve as a control of legislation and administration.

4. They safeguard important forest policies and practices against partisan politics, legislative abuses, and administrative weaknesses.

5. They insure a continuity of sound forest policies and practices.

DISADVANTAGES

1. They clutter up constitutions with legislative and administrative detail that properly belongs in administrative codes, laws, rules, or regulations.

2. They remain long after their need has disappeared, for constitutions are not subject to the ordinary process of change used in enacting, amending and annulling laws. This weakness is, however, being gradually corrected by the use of the popular initiative method of constitutional amendment first adopted in Oregon in 1902, and now in force in 14 states, only three of which are east of the Mississippi River.

3. They delay greatly or prevent entirely the making of desirable changes in forest policies and practices.

4. They check progress, bar improvements, embarrass administration, and even prevent urgent administrative reorganization.

5. They permit an enthusiastic and highly organized minority to dominate forestry matters, for, as a rule, a relatively small proportion of eligible voters register their vote on constitutional amend-

ments and an even smaller number understand their content.

That state constitutions have increased enormously in size is a well-known fact. That they contain a lot of obsolete, useless, and irrelevant material is certainly true. It seems highly important, therefore, to guard against cluttering up our constitutions with forestry provisions that serve no real purpose or that could be more appropriately placed in codes, laws, or administrative rules and regulations. A national committee on state government published a model state constitution in 1921, which has since been revised three times. In this model constitution, forestry is given a place under the general heading of "Public Welfare", and the following provisions, taken verbatim from the constitution of Massachusetts, where it was placed in 1918, is recommended by this committee as appropriate and adequate:

The conservation, development and utilization of the agricultural, mineral, forest, water and other natural resources of the State are public uses, and the legislature shall have power to provide for the taking, upon payment of just compensation therefor, of lands and easements, or interests therein, including water and mineral rights, for the purpose of securing and promoting the proper conservation, development,

utilization and control thereof and to enact legislation necessary or expedient therefor.

Whether the foregoing constitutional provisions for forestry are generally appropriate and adequate cannot be determined properly at this time, for their use has been limited to a single state, the testing period has been extremely short, and thus far no critical study has been made of other constitutional provisions for forestry, nor does there exist a reliable appraisal of other instruments of administrative direction and control in forestry. The writer plans to continue this preliminary study of forestry in our constitutions, and, if possible, to enlarge its scope to include an administrative appraisal and interpretation of the forestry content of administrative codes and ordinary statutes. Without such special studies and comparative surveys of existing agencies an enduring administrative foundation and framework for forestry cannot be designed and developed with any assurance of worthwhile results. There exists an immediate and pressing need for more and better research in the whole field of forest administration. This is especially necessary at a time when forestry is making extremely rapid progress.



PHILIPPINE JOURNAL OF FORESTRY

ANNOUNCEMENT has been made of a new quarterly printed publication of the Philippine Bureau of Forestry to be known as the *Philippine Journal of Forestry* to take the place of the mimeographed *Makiling Echo*, for fifteen years the official publication of the Bureau. The editorial work for the *Philippine Journal of Forestry* will continue to be handled in the Division of Forest Studies and Research, Bureau of Forestry, Manila.

RECENT STATE LAWS ON FORESTRY

By KATHERINE MARKWELL
U. S. Forest Service

IN 1891, when Congress first authorized the establishment of forest reserves, as the National Forests were then designated, much of the public domain, especially in the eastern part of the United States, suitable for such reserves had already passed, in whole or in part, into private ownership. It was not until 1911, when the Weeks Act was passed, to be amended and broadened by the Clarke-McNary Act in 1924, that desired additions were authorized by purchase of state or privately owned lands. However, the resultant federal control of the land necessitated the consent of the state wherein the land was located before such purchases could be made.

NATIONAL FORESTS

At the last session of its legislature South Dakota passed a general enabling act, similar to previous acts passed by Alabama, Arkansas, California, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Michigan, Minnesota, Mississippi, Missouri, Montana, New Hampshire, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, and Wisconsin. These acts consent to acquisition of land by the United States by purchase or otherwise, for the establishment of or additions to National Forests, with civil and criminal jurisdiction concurrent in both state and federal governments.

Furthermore, South Dakota granted authority to purchase from counties at their appraised valuation those tax delinquent lands on which no bid in excess thereof

was received at public sale, and sanctioned the exchange of school lands located in public forests for federal lands of equal value.

Tennessee amended her enabling act to require that approval of such purchases be made by the federal government rather than the President of the United States, and by the governor in addition to the state forester.

Georgia enacted legislation enumerating specific counties wherein additions could be made to the National Forests in place of a prior act designating the location as "in the Mountain Region of Georgia".

Maine, Nevada, New Mexico, and North Carolina consented to acquisition of specifically designated tracts of land, New Mexico recommending to the federal government that their administration be carried out on a sustained yield basis.

Minnesota proposed to amend the state constitution, subject to vote in 1938, to permit the exchange of state and federal lands.

Washington authorized the exchange to private, county, municipal, state, or federal lands for purposes of consolidating and blocking up the respective land holdings of any county, municipality, state or National Forests.

FEDERAL COOPERATION

The Clarke-McNary Act also offered federal aid to the states for the promotion and protection of state and privately owned forests. In 1935, the Fulmer Act empowered the Secretary of Agriculture to enter into cooperative agreements to extend further such federal cooperation with the states, to stimulate the acquisi-

tion and development of State Forests, and to coordinate federal and state activities for the organization and proper administration of an adequate and recognized system for state forest land management. However, various requirements as to state management and tax delinquency laws must be complied with before the states are eligible to enter into such cooperative agreements.

To facilitate such cooperation, California, Connecticut, Idaho, Illinois, Indiana, Montana, and New Hampshire passed general acts authorizing the appropriate department of the state or county to accept gifts or contributions of land suitable for forestry or park purposes, to enter into agreements with the federal government or other agencies for acquiring by lease, purchase or otherwise such lands as were desirable, to make expenditures for administration, and to dispose of products from which all revenues are to be segregated by the state treasurer until all obligations due the federal government are satisfied.

Alabama and Michigan amended existing laws to facilitate such cooperation.

Tennessee, by joint resolution, advised the need of a hundred State Forests of ten thousand acres each and recommended that five million dollars be allotted under the Fulmer Act for their purchase.

TAX DELINQUENT LAND

Tax delinquency laws were amended to bring such land, if bid in by the state, into the State Forests when they are suitable for such purpose.

Florida perfected title in the state in all such lands with tax certificates outstanding for two years.

Michigan amended an existing act to withhold from sale such lands as are suitable for forests, parks, and game refuges and to reimburse the counties therefor at twenty-five cents per acre.

Oregon granted to county boards the

power to administer, exchange, sell, lease, etc., any lands acquired by foreclosure for delinquent taxes and to cooperate with the federal government, the state and other counties in their protection and reforestation, and to enter into all necessary agreements.

Pennsylvania empowered counties to sell such lands to the state at a consideration of the taxes for the five years just preceding.

Tennessee authorized the state forester to examine delinquent tax lists of counties so that the state may acquire those suitable for forests and when any such lands are once dedicated as State Forests, their redemption is forbidden even under the act for relief of delinquent tax payers.

Washington sanctioned the donation, sale or lease by counties to the state of any land suitable for State Forests including those acquired by tax foreclosure, and cancelled the delinquent taxes on such lands when donated.

STATE FOREST ACQUISITION

However, the acquisition of tax delinquent lands was not the only method for enlargement of the State Forests employed by the legislatures.

The Department of Conservation of North Carolina is given power to purchase, through exercise of eminent domain, certain Resettlement Administration lands for administration as State Forests.

Pennsylvania proposed to amend the state constitution to permit a million dollar bond issue for the purchase and development of State Forests.

Tennessee authorized Campbell County to issue bonds to the value of twenty-five thousand dollars for the acquisition of State Forest lands.

Washington voted to permit the issue of utility bonds not to exceed three hundred thousand dollars during the biennium expiring March 31, 1939, for purchase, re-

forestation and administration of State Forests.

The Department of Conservation of Illinois may exchange state lands for those of the federal government suitable for forests.

Certain lands were withdrawn from the White Earth State Forest in Minnesota, but all lands and water she owns or hereafter acquires in specified territory are made a part of the Finland, Colquet Valley, and Fort Hills State Forests.

Cities and towns were empowered to convey, and the State Forestry Board to accept, sites for forestry buildings in Washington.

Certain real and personal property of Pennsylvania was transferred to the Pennsylvania State College and the Pennsylvania State Forest School at Mont Alto in exchange for the tree nursery belonging to the College.

FORESTRY ADMINISTRATION

The state forestry organizations of the forty-eight states differ widely as to the department under which forestry is administered and the functions assigned thereunder. During the past year drastic changes therein were made in some states while others amended their relevant laws more or less extensively.

In Georgia the Department of Forestry and Geological Development, the Department of Game and Fish and the Commission of Forestry and Geological Development were replaced by a Department of Natural Resources under the direction of a commissioner who is appointed by the governor, as are the directors in charge of each of the four divisions: 1. Forestry; 2. Wildlife; 3. Mines, Mining, and Geology; and 4. State Parks, Historic Sites, and Monuments. The director, assistant director of forestry and the district foresters must be graduates of the University of Georgia or a recognized school of forestry; in addition, the director must have

had four years of executive and administrative experience in forestry.

Oklahoma abolished the State Planning Board, the Conservation Commission, and the Forest Commission and established in their places the Oklahoma Planning and Resource Board which may acquire by purchase, lease, gift, or otherwise, any and all necessary property and may cooperate with the federal government. The Division of Forestry, whose director must have the same qualifications as are required in Georgia, together with the Division of State Planning, the Division of Water Resources and the Division of State Parks, carry on the work of the Board.

Tennessee transferred the functions of the Board of Conservation for Game, Fish, and Wildlife, the State Director of Game and Fish Conservation, Division of Forestry, formerly under the Department of Agriculture, the Division of Geology, and the State Park and Forestry Commission, to a newly created Department of Conservation under a Commission which was empowered to organize the work of the Department. A later act created and established the Forestry Division under the commissioner who shall appoint a state forester with at least five years experience. "State Forests" were defined as land owned by state which "by reason of their nature, are suited to continuous public forestry, including timber production, forestry experimentation and research, watershed protection, wildlife conservation, forest recreation, or which because of geographical location and character are suitable bases from which to provide conservation service to privately owned lands for general upbuilding or self-renewing natural resources." The state was authorized to acquire by purchase, gift, lease, or otherwise, land for the State Forests and to cooperate with all governmental agencies therefor.

By a constitutional amendment voted in November 1936, Missouri gave control

and management of the restoration, conservation and regulation pertaining to bird, fish, game, forestry and all wildlife resources to a conservation commission of four members with power to appoint a Director of Conservation. Power is given the Commission to acquire all property necessary to carry out the act by purchase, gift, eminent domain, or otherwise.

Minnesota changed her organization from a conservation commission to a Department of Conservation under a single commissioner, with a director over each division: (1) Division of Forestry, (2) Division of Drainage and Waters, (3) Division of Game and Fish, (4) Division of Lands and Minerals, and (5) Division of State Parks. The commissioner is to classify all state lands and determine which are to be administered for forestry purposes.

Colorado substituted the State Board of Land Commissioners for the State Board of Agriculture as constituting the State Board of Forestry. An independent state forester, who must have at least four years training at a recognized school of forestry and two years professional experience, replaced the former ex-officio one. Provision was also made for the establishment of State Forest units to be administered on sustained yield bases and for recreational uses where suitable.

Oregon added another member to the Board of Forestry who is to be the government representative of the Western Oregon Livestock Association and the Oregon Cattle and Horse Raisers Association. She also authorized the state forester to appoint an assistant.

Maine created a State Personnel Board and established a merit system but omitted therefrom all employees of the Forestry Division. The County Court of Oregon may establish a county land classification commission of five members, three appointed by the court, one by the State

Board of Forestry, and one by director of the State Agricultural Experiment Station, for the classification of forest lands in the state as primarily suited: (a) for the production of timber, (b) for joint use for timber production and the grazing of livestock, (c) for grazing or other agricultural use. If the Commission makes no classification the State Board of Forestry may empower the state forester to make it.

MANAGEMENT AND PROTECTION

The management and protection of the forests themselves are important items in preserving and securing the best returns therefrom.

Idaho created cooperative sustained yield districts and required owners in such districts to file with the state forester the location and size of any area before the lumbering or harvesting of the forest crop, therein. General forestry practices were prescribed for all lumber operations and limitations were imposed on the cutting of white and yellow pine.

The Division of Forestry with the approval of the Commissioner of Conservation in Minnesota must approve all timber sales. Minnesota amended her laws against timber trespass on state forests.

Tennessee seeks to encourage sustained yield units by joining, cooperatively, privately owned and/or state owned forests with common protection and making timber trespass a felony on state or privately owned timberland without a certificate from the owner and a misdemeanor for any sawmill operator, person, firm, or corporation to buy such timber without proper certificate.

The Board of County Commissioners of Putnam County, Florida, received specific authority to appoint a timber warden and a civil engineer to patrol and protect timberlands thereon and to prevent timber trespass on tax delinquent lands.

Colorado, Minnesota, and Washington

provided for sale of timber in state lands and the administration of cutting permits therein.

Nevada and South Carolina prohibited taking of trees, flowers, and shrubs from state or private lands without permission.

Minnesota and Washington regulated the sale of Christmas trees.

Washington prohibits cattle or horses upon state lands in tracts of 700 acres or more.

The agents or caretakers, appointed by the state forester in New Hampshire, were given the same powers as a constable for the protection of State Forest reserves or recreational areas or any federal area under the administration of the Commission.

In Illinois trees for research, experimental or demonstration planting may be furnished without cost to land owners whose planting plans are approved by the Department of Conservation.

The tree bounty law of South Dakota was amended to exclude therefrom recipients of free trees or free tree planting and care thereof, such as may be provided under contract or agreement with federal or state government.

Kansas requires license for sale of nursery stock grown out of the state.

The Department of Conservation of Minnesota is authorized and directed to acquire power spraying equipment for combating forest insects, and to cooperate with the state entomologist with provision for certain charges to private land owners. An Interim Commission was created in Minnesota to study the report of the Reforestation Commission of 1928 and investigate the development of woodlots, windbreaks and shelterbelts in agricultural sections.

PUBLIC INSTRUCTION

Oklahoma required the instruction in schools of the conservation of natural resources of the state, including forestry, and directed the State Board of Educa-

tion to formulate and adopt courses of study therefor.

FIRE CONTROL

One of the greatest sources of timber loss and greatest danger to forests is fire. Permanent and adequate protection is essential. Many states enacted legislation for further control or prevention thereof.

County patrol districts may be established in Nevada upon petition of twenty-five per cent of the land owners in a district which is not included in an existing fire control district or patrolled by the U. S. Forest Service.

South Carolina authorized control districts in four counties.

Colorado empowered the State Board of Land Commissioners to protect lumber in state lands by every possible means and to cooperate with the U. S. Forest Service to construct fire lines around all exterior boundaries and to supply fire fighting appliances and equipment.

In Georgia the Director of the Division of Forestry may appoint fire wardens.

South Carolina made the state forester a member of the Fire Control Board in Richmond County.

The state forester in Oregon is to supervise the adaptation of the fire control laws and practice to further the uses specified as by burning under control and the compulsory seeding for grazing by the owner of the areas burned.

The U. S. Forest Service Bulletin "Work of the U. S. Forest Service" states "Among the chief causes of fire (in forests) are smokers, incendiarism, debris burning, campers, lightning, railroads, and lumbering operation." Some specific enactments to decrease and eliminate these dangers were made.

South Dakota and Wyoming imposed penalties for throwing burning substance from any moving vehicle in the highway.

A Wisconsin law limited the law to those cases where damages resulted, and

declared a felony the wilful and malicious setting land on fire.

South Dakota penalized negligent or careless setting of fires in timber or for leaving a fire uncontrolled without every effort to extinguish it and notify the authorities.

Georgia and Utah declared fires burning uncontrolled were a public nuisance, and Georgia required the person responsible to control or extinguish them or pay therefor.

Permit systems were enacted or modified in various states. Connecticut authorized the state forest fire warden to designate the time after June 1 within which fires might be kindled in open air without a permit.

In Georgia, the Director of Forestry may fix definite periods not exceeding thirty days in any year during which woods may be burned over.

Indiana requires permits for burning within a half mile of any federally owned land.

The Governor of Illinois may close definite areas to any open fire in woods, brush or grass to all persons without a permit from the Department of Conservation.

The chief warden in Utah designates the closed season.

Oklahoma specified that notice must be given the local protection agency before any grass lands or woods are burned.

North Carolina forbids fires in protected areas between April first and June fifteenth or between October fifteenth and December first.

Oregon extended her closed season beginning May 15 from October 1 to December 31; and Washington amended her act to make the closed season from

April 15 to October 15 rather than May 1 to October 1.

Minnesota provided for clearing of roads 200 feet from center both ways and closed all forest roads except state highways.

In Indiana all highways except state highways within state lands, including forests, may be vacated by the state Department of Conservation and permits are required for construction of utility, telephone or telegraph lines on public highways and state land.

Washington amended her existing law as to spark arresters on railroad and logging locomotives and required patrols behind trains and specified the fire control equipment to be carried. Logging companies must fight logging fires with the full limit of employees to control fires and the supervisor of forestry may close down logging in times of serious danger.

Half of the fines for fires is given to the informant in Alabama, while Oklahoma allots fire fines to the school fund.

TAXATION

Taxation of privately owned forest lands, with fairness to the taxpayers on both forests and other agricultural lands, is a problem the most advantageous solution of which has not yet been agreed upon by forestry experts. Only four states made any changes in their laws in this regard. Arkansas and New Mexico provided a severance tax on timber, and Arkansas allotted it to the state forestry fund. Alabama deferred taxation on auxiliary state forest timber. If woodland tracts comprise $\frac{1}{5}$ or less of any farms in Wisconsin, that part thereof is exempt from taxation.

INSTITUTIONAL VERSUS TECHNOLOGICAL FACTORS IN WOOD CONSUMPTION¹

By JULIAN S. DUNCAN
Babson Institute

At times some foresters even seem to be doubtful concerning the capacity of the nation to use all the wood 500,000,000 acres of forest land is capable of producing. Mr. Duncan analyzes the causes for the secular downward trend of lumber consumption. He points out that the majority of urban American dwellings are sub-standard and obsolete and suggests that a democratic welfare economy should make housing one of its major objectives. The conclusion is reached that the problems of the volume of lumber consumption are not technological but institutional and that an intelligent society would find use for all the wood the available forest land can produce.

THE methods and results of estimates of future wood requirements depend on the type of assumptions made. The postulates may concern institutional or technological factors. Continuous change may be anticipated in technology and the past history of the race justifies the assumption of change in institutions. The first part of this paper will, for the sake of clarifying the influence of technological factors, assume that the chief sociological obstacles to the optimum utilization of potential productive capacity have been surmounted. Those who are apathetic about the application of forestry tend to stress the technological factors in declining per capita consumption of lumber; this is the reason for centering attention on it here.

The chief explanation of the declining trend of lumber consumption per capita has been the completion of the process of providing the rapidly developing country with residences, farm, factory, and public buildings. A larger proportion of present building is for replacement. The rate of population growth, also, is slowing down. The rate, however, is in part a function of the success of the economy in providing security for citizens. What constitutes an optimum population concen-

tration for any given area is a matter for investigation and planning and I only wish to suggest that students of consumption analyze the assumptions on which population curves are made. An industrial society which succeeded in applying engineering principles to its economic processes would, in the absence of definite measures of restraint, find its population increasing at a more rapid rate.

The absolute volume of construction has passed its zenith and the secular trend of lumber use per unit of construction also has been downward. One of the factors in the trend of declining lumber consumption per unit of construction has been urban concentration. But technological changes, not to speak of America's wealth of natural resources, now make practicable any degree of demographic diffusion which may be deemed socially desirable.² The preference of the average human being for less congested surroundings, including, if desired, the detached one-family house, could be satisfied without compelling him, as under unplanned conditions, to spend too much of his time going to and from work. We cannot properly speak of consumers having any real choice between apartments and single-family dwellings, when the latter, in the

¹This paper is a part of a study of forest policy the completion of which has been made possible by a Grant-in-Aid from the Social Science Research Council and a supplementary subvention from St. John's College.

²Lewis Mumford has pointed out that the logical habitat of neotechnic civilization is in the upland areas. See his *Technics and Civilization*, New York, 1934, 238.

present state of the location of commercial and industrial jobs, involve substantially increased work-travel distances over congested highways. There is, also, no reason why summer homes (detached one-family) in the country could not be provided for all who are compelled to live in urban multi-family houses during the winter. Intelligent planning could not only make an environment suited to man's nature but also distribute justly the burdens involved. The investment of cities in utilities for areas blighted by bad planning is one example of the costs which would have to be provided for.

The end of the period of heavy immigration, rapid population growth, and agricultural expansion has been a principal factor in slowing down the rate of building new urban and rural residential units but the majority of American urban dwellings are *substandard* and obsolete, judged by the best contemporary planning and architectural practice. The criteria include such fundamental matters as surrounding open space, cross-draft ventilation for each family unit, orientation to sunlight, community layout, absence of through streets and the provision of pedestrian underpasses where it is not possible to avoid through vehicular traffic. A vivid illustration of how far we have yet to go may be found in the Real Property Inventory's figures on the amount of urban housing lacking elementary plumbing facilities.

The standards of modern housing are a result of a long process of study of human needs and experimentation on how best to meet them. Good housing would, therefore, not be something "imposed" on citizens. The records of the ratio of applicants to available facilities in scientifically planned housing projects indi-

cates that adequate housing is a basic human want; the masses, when given the opportunity to purchase it at prices within their means and at bearable distances from work, tend to pick the best.³ Choice of housing facilities for the majority of the urban population, in any proper sense of the word, does not exist prior to various types of public subsidies just as the choice of whether to get an education or not did not come about for the lower income groups until education received generous subventions from public bodies. We may conclude, therefore, that a democratic welfare economy would make housing one of its major objectives. It is assumed, of course, that decisions as to the amount and kind of housing would not be left to those directly or indirectly connected with the building industry and real estate business; final decisions about these matters would be made by the public based upon the advice and information furnished by local, state, and national planning and housing authorities.

Replacement of obsolete housing would, of course, be a gradual process, and housing, in a dynamic society, would never be once and for all completed. Technological changes and artistic creation would, in all probability, make necessary a continuous revision of housing norms. The national housing authority could, as a means of avoiding cyclical changes—both short and long—in economic activity, use the replacement of obsolete housing as the flexible backlog. For even a collectivist society, as Arthur F. Burns has pointed out, would find that construction would oscillate violently if new housing were adjusted merely to changes in the rate of population growth (or decline) and internal migration.⁴ Construction during years in which the

³See Coleman Woodbury, "Integrating Private and Public Enterprise in Housing," *Annals of the American Academy of Political and Social Science*, March, 1937, 171.

⁴See Arthur F. Burns, "Long Cycles in Presidential Construction," in *Economic Essays in Honor of Wesley Clair Mitchell*, New York, 1935, 75-93.

supply of new houses exceeded population requirements could be concentrated on replacement and vice versa.

The amount of annual new construction under such a program could be regulated so as to provide work for all available construction labor and would require materials enough to give a constant stimulus to many industries, including, of course, those manufacturing building materials. The building responsibility would include, in addition to urban housing, the provision of adequate housing, including modern conveniences, for all farm owners, tenants and laborers, and residents in small towns and villages. It may be assumed that the long-sighted planning of construction would foster the utilization in every locality of those materials which are cheapest both from the standpoint of money cost and relative drain on natural resources.

The socio-monetary cost of timber produced under conditions of scientific forest management and utilization, as every forester knows, is low: (1), because of the value of the by-products of lumber manufacture such as plywood, wood pulp and, more recently, even prospective food substances from sawdust; (2), because of the by-products of timber growing, such as the provision of recreation and game producing areas, watershed protection, water conservation, soil erosion control, and grazing for livestock; (3), because of the amount of land area whose only

economic use, under present conditions, is forestry. Timber cut on a sustained-yield basis involves no drain on natural resources; this method of land utilization increases the fertility of the soil, and softens the force of winds and temperature changes. The weight of existing evidence on the properties of wood points to its suitability as one of the construction materials for as long as we can see into the future. This justifies the expectation that wood products would play a part along with glass, concrete, steel, brick, mud, and other natural and synthetic substances.

The state of present knowledge points to the conclusion that an intelligent society would find use for all the wood the available forest land can produce. The volume utilized in the form of cellulose following chemical or mechanical manipulation would probably go on increasing, as Figure 1 on trends in the U.S.A. suggests, while the relative amounts used in the original form would decrease. Such a society, however, would probably frown on changing the form of materials merely to give itself more to do. Another possibility of increased use of wood, it may be noted in passing, is for furniture. We have not yet learned to combine the natural grain and finish of wood with mass production methods for the production of inexpensive but *beautiful* furniture. The southern and northwestern regions of the United States, also, possess

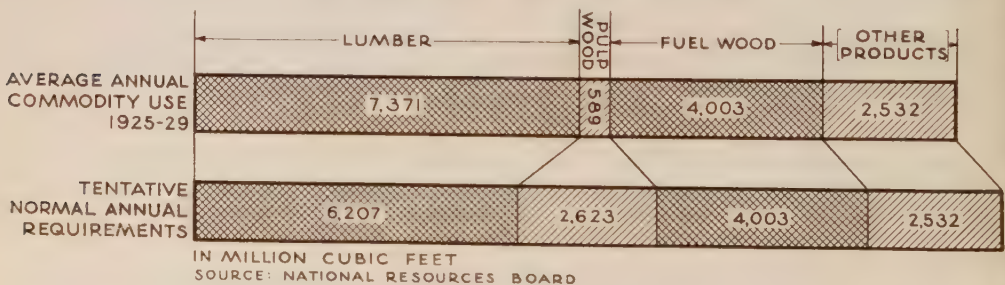


Fig. 1.—Tentative normal timber commodity requirements compared to average commodity use for 1925-29 by item of use.

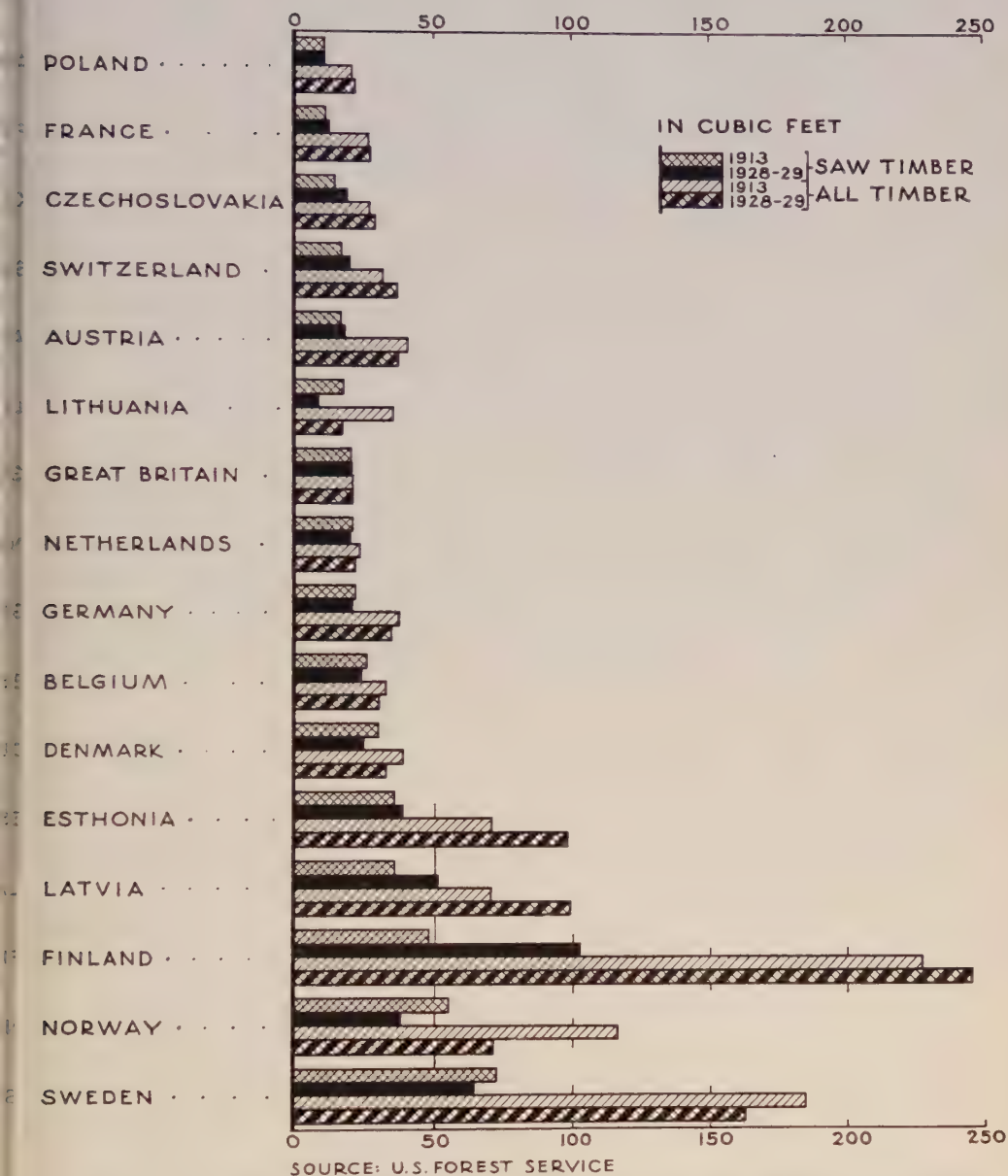


Fig. 2.—Per capita annual timber consumption in European countries, 1913 and 1928-29 (in equivalents of standing timber).

such inherent advantages in timber production that it may be postulated that ways would be found to exchange some of the products of American forests for wanted goods in other lands.

The conclusion to which this analysis points is that the more difficult problems of the volume of lumber consumption are not technological.⁵ It follows then that institutional factors, the solution of which was assumed at the beginning of the paper, present more obstacles. Failure to use the available technics, i.e., the science of forestry and wood utilization, has been one of the principal factors in the decline of lumber consumption per unit of construction. For the failure to practice forestry has been the most important influence behind the secular trend of increasing delivered prices of lumber as compared with other building material prices.

Assuming the surmounting of sociologi-

cal obstacles is admittedly taking a long leap. Yet the *raison d'être* of the investigations of social scientists is the postulate that man can learn to control his social evolution, that in the field of economics institutions can be invented to assure the manufacture and distribution of the goods which modern technology makes possible. The recent passage of the Wagner-Steagall Housing Act, moreover, is a definite step toward the realization of this pre-supposition. It is the most significant single housing step taken so far in this country. National policy accepts the principle of *annual subsidies to state and local public housing authorities for low income groups*. It is, from standpoint of the U.S.A., the invention of an institution.

It also may be anticipated that the present movement for better forest practices and the rehabilitation of devastated areas will go on with increased momentum and this should have favorable repercus-

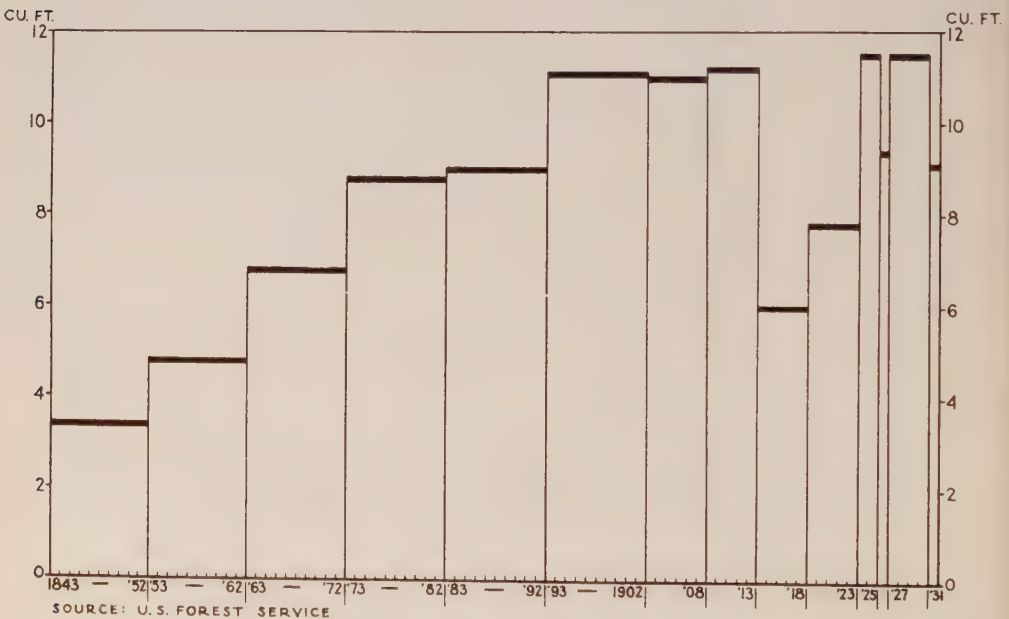


Fig. 3.—Average annual imports per capita of unmanufactured timber other than pulpwood into Great Britain.

⁵See William F. Ogburn, *Social Change*, New York, 1922, 203-210.

sions on consumption. This will follow not simply because of lower delivered prices but because the rehabilitation of forests in the populous eastern consuming regions will give these potential customers a chance to learn something about forestry. The resulting increased interest in forestry will tend to stimulate the use of forest products.⁶ The experience of the most highly industrialized countries of Europe is that their need for wood has been increasing. Figures 2 and 3 based on figures of Zon and Sparhawk show the trend. These countries, it may be noted, passed the frontier stage long ago.

The demand for most wood products, unlike that for food, is relatively elastic and therefore capable of expansion. The line of reasoning presented here has been confined to housing and furniture. It may be also applied to the use of wood cellulose for printed and illustrated matter, plastics and clothing, and fabricated wood products.

Public and other agencies investigating the probable future trend of timber consumption should make calculations on the basis of a number of hypotheses and one

of these should be the postulate of positive advance in solving the problem of purchasing power. The one now employed, that of estimating on the basis of normal business activity—normal being defined as that state in which the country is conscious neither of great prosperity nor severe depression—should be supplemented by other estimates which posit varying degrees of success in reducing the gap between the best existing housing standards and present conditions.

The analysis presented in this paper suggests, also, the desirability of making sampling surveys of housing conditions in which the best European and American standards are used as criteria. Investigations like the Real Property Inventory and the Farm Housing Survey, based on conventional standards, have given us valuable and needed knowledge about our housing plant. There is need, however, for other sampling surveys which would reveal the extent to which our housing patterns measure up to the best European and American standards. Estimates of probable future lumber requirements could then be developed showing how much would be required if our housing standards were raised.

⁶I am indebted to Raymond E. Marsh for this suggestion.

SUSCEPTIBILITY OF RIBES¹ TO CRONARTIUM RIBICOLA IN THE WEST

By J. W. KIMMEY²

Division of Forest Pathology, Bureau of Plant Industry

SOON after the discovery of white pine blister rust (*Cronartium ribicola* Fischer) in western North America in 1921,³ it became evident that the rust was well-established and that immediate control was necessary if the valuable white pine forests of the region were to be protected from this destructive parasite. One of the essentials of planning effective control of this disease is knowledge of the ability of the various alternate host species (ribes) to harbor and spread the causal fungus. Large-scale studies carried on by the Portland office of the Division of Forest Pathology in British Columbia from 1921 to 1932, inclusive, and in Oregon from 1930 to 1935, inclusive, by artificial and natural inoculations have given a good basis for the determination of the susceptibility and

telium-producing capacity of the various ribes species.⁴

The purpose of this paper is to classify all the species of ribes studied in the West, in order of their susceptibility to infection and their capacity to produce telia. The susceptibility of some of the species has previously been reported,^{5 6} and figures for these species are included here for the purpose of comparison and to complete the scale of susceptibility for the entire group of ribes studied in the West.

METHODS

The selection of study areas and the development of the study methods for the large-scale ribes susceptibility studies in the West have been described in detail in a previous paper by Mielke and others,⁷

¹The generic name *Ribes*, as well as the common noun "ribes", is used in this paper to include both currants and gooseberries.

²The writer is indebted to H. G. Lachmund, formerly of the Division of Forest Pathology for the initiation of the studies and assistance in the collection of the basic data of this paper, and also to J. L. Mielke, T. S. Buchanan, and J. R. Hansbrough of the Division of Forest Pathology and C. N. Partington, W. V. Benedict, C. J. Nussbaum, and A. A. McCready formerly of that division, for their assistance in the collection of data. Especial indebtedness is acknowledged to the late A. T. Davidson, in charge of blister rust investigations for the Dominion Government, to Dr. H. T. Güssow, Dominion Botanist, and to other members of the Dominion and Provincial Governments for their friendly cooperation during the course of the investigations in Canada.

³Davidson, A. T. Report of the Proceedings, Third Meeting, White Pine Blister Rust Conference, Portland, Oreg. Nov. 22-23, 1923. (Mimeog.).

⁴G. G. Hahn has shown (by his greenhouse studies) that many of the ribes species of the Pacific Northwest are susceptible to infection by *Cronartium ribicola*. See Hahn, G. G. The inoculation of Pacific Northwestern ribes with *Cronartium ribicola* and *C. occidentale*. Jour. Agr. Research 37:663-683. 1928.

⁵Mielke, J. L., T. W. Childs, and H. G. Lachmund. The susceptibility to *Cronartium ribicola* of the four principal ribes species found within the commercial range of *Pinus monticola*. Jour. Agr. Research 55:317-346. 1937.

⁶Mielke, J. L. and J. R. Hansbrough. Susceptibility to blister rust of the two principal ribes associates of sugar pine. Jour. For. 31:29-33. 1933.

⁷Mielke, J. L., T. W. Childs, H. G. Lachmund. Op. cit.

but a brief summary of them seems necessary here.

Test plants of each species were divided into three classes (called "forms"): open form, part-shade form, and shade form, data from which were kept separate throughout the study. Bushes exposed to the sun during most of the day were classed as open form, while those receiving little or no direct sunlight made up the shade-form group. Part-shade plants were approximately intermediate in exposure.

Data accumulated over a period of years for each form of each species were grouped in two classes: Those secured under conditions characterized by heavy infection, and those secured under conditions characterized by light infection. Conditions characterized by heavy infection occurred where the ribes grew in close proximity to an abundance of sporulating cankers on pines (usually within 25 to 50 feet) or where the ribes were artificially inoculated. Conditions characterized by light infection occurred where sporulating cankers were further from the ribes and usually less numerous.

The object of the study was to determine the capacity of the species and their various forms under natural conditions to develop infection and produce telia. The determination of these factors constitutes a basic element in the study of the capacity of the ribes to spread infection and cause damage to associated pines. Their reaction to the rust under conditions characterized by heavy infection, i.e., close to heavily infected pines or after heavy inoculations simulating such conditions, was used as the criterion. The artificial inoculations were made in the spring at a time when the ribes leaves were young and succulent, and just before a rain, by placing fruiting blister rust cankers in large paper bags which were used in bellows fashion to shower the leaves with aeciospores.

Systematic examinations were made at

approximately monthly intervals from the time of inoculation (whether artificial or natural) until late fall when the plants were approaching complete defoliation. At each examination the total number of leaves and the number of infected leaves on each bush were determined. Estimates were made of percentage of surface infected on infected leaves, and percentages of infected surface bearing telia, bearing uredia, dead before the production of telia, and lost through defoliation before the production of telia. A complete record of infection for each individual bush was thus secured.

RIBES SPECIES STUDIED AND BASIS USED

Over a period of years since 1921 the susceptibility of the various ribes species in the West has been studied by the Portland Branch of the Division of Forest Pathology. Table 1 lists alphabetically the species and forms studied and the basis used in each.

In addition to the basis shown in Table 1, hundreds of ribes plants were examined each year while scouting to determine the annual distribution of the rust in the West. The records of this infection consist of one systematic examination on each plant, usually made during the fall when the rust intensification was nearing completion and telial development was about at its peak. These records add materially to the data as a basis for classifying the various forms of species in the proper order of their susceptibility and capacity to produce telia.

The basis for *Ribes nigrum* consists of over a thousand tests or observations wherein systematic data were taken periodically throughout the season, and several thousands observations wherein but one systematic examination was made per season.

The native ribes species of British Columbia were tested in their natural habitat at numerous localities throughout their

TABLE 1
RIBES SPECIES STUDIED AND BASES USED

| Technical name | Species | Common name | Form | Bases for | | | | | |
|--|---------|--------------------------|------------|-----------------------------|---------------|--------------------|-----------------|---------------|--------------------|
| | | | | Conditions characterized by | | | Heavy infection | | |
| | | | | Years studied | Areas sampled | Tests ¹ | Years studied | Areas sampled | Tests ¹ |
| | | | | No. | No. | No. | No. | No. | No. |
| <i>Ribes acrifolium</i> Howell... | | Maple-leaved currant | Open | 2 | 1 | 71 | — | — | — |
| <i>R. americanum</i> Mill. | | Part-shade | Part-shade | 2 | 1 | 69 | — | — | — |
| <i>R. aureum</i> Pursh... | | American black currant | Open | 3 | 1 | 95 | — | — | — |
| <i>R. binominatum</i> Heller | | Yellow flowering currant | Shade | 3 | 1 | — | 2 | 1 | 10 |
| <i>R. bracteosum</i> Dougl. | | Siskiyou gooseberry | Part-shade | 6 | 9 | 179 | 2 | 1 | 119 |
| | | Stink currant | Open | 2 | 5 | 358 | 1 | 1 | 6 |
| | | Part-shade | Part-shade | 6 | 11 | 136 | — | — | — |
| | | Shade | Shade | 6 | 11 | 733 | 6 | 3 | 228 |
| <i>R. cereum</i> Dougl. | | Squaw currant | Open | 1 | 1 | 9 | 3 | 4 | 251 |
| | | Shade | Shade | — | — | — | 2 | 1 | 37 |
| <i>R. cruentum</i> Greene | | Shiny-leaved gooseberry | Part-shade | 3 | 1 | 104 | 2 | 1 | 64 |
| <i>R. divaricatum</i> Dougl. | | Coast black gooseberry | Open | 6 | 17 | 997 | 5 | 2 | 102 |
| | | Part-shade | Part-shade | 4 | 5 | 116 | 5 | 1 | 100 |
| | | Shade | Shade | 7 | 11 | 826 | 7 | 2 | 659 |
| <i>R. erythrocarpum</i> Coville & Leiberg | | Crater Lake currant | Part-shade | 3 | 1 | 137 | 2 | 1 | 85 |
| <i>R. hallii</i> Jancz. | | Hall's sticky currant | Part-shade | 3 | 1 | 134 | 2 | 1 | 89 |
| <i>R. inerme</i> Rydb. | | White-stemmed gooseberry | Open | 3 | 2 | 182 | 5 | 3 | 384 |
| | | Part-shade | Part-shade | 2 | 2 | 95 | 3 | 3 | 185 |
| | | Shade | Shade | 2 | 1 | 64 | 5 | 3 | 405 |
| <i>R. irriguum</i> Dougl. | | Inland black gooseberry | Open | 2 | 1 | 2 | 3 | 1 | 45 |
| <i>R. idamathensi</i> Coville (Klamath Lake ²) | | Klamath gooseberry | Part-shade | 3 | 1 | 33 | 2 | 1 | 22 |
| <i>R. idamathensi</i> Coville (Prospect ³) | | Klamath gooseberry | Part-shade | 3 | 1 | 23 | 2 | 1 | 16 |
| <i>R. lacustre</i> (Pers.) Poir. | | Prickly currant | Open | 7 | 14 | 643 | 8 | 7 | 1155 |
| | | Part-shade | Part-shade | 5 | 6 | 275 | 6 | 6 | 482 |
| | | Shade | Shade | 7 | 14 | 1263 | 8 | 9 | 1755 |

| | | | | | | | |
|---|----------------------------|------------|---|----|-------|---|------|
| <i>R. laxiflorum</i> Pursh. | Coast trailing currant | Open | 3 | 4 | 253 | — | — |
| | | Part-shade | 3 | 6 | 89 | — | — |
| | | Shade | 3 | 6 | 82 | — | — |
| <i>R. lobtii</i> Gray | Gummy gooseberry | Open | 5 | 10 | 916 | — | — |
| | | Part-shade | 1 | 1 | 30 | — | — |
| <i>R. marshallii</i> Greene | Applegate gooseberry | Part-shade | 3 | 1 | 166 | 1 | 109 |
| <i>R. nevadense</i> Kell. | Sierra currant | Open | 1 | 2 | 44 | 2 | 90 |
| | | Part-shade | 1 | 2 | 67 | 2 | 159 |
| | | Open | 6 | 22 | 996 | 5 | 37 |
| <i>R. nigrum</i> Lindl. | European black currant | Open | 6 | 22 | 996 | 3 | 18 |
| <i>R. niveum</i> Lindl. | Snake River gooseberry | Open | 2 | 1 | 74 | 5 | 382 |
| <i>R. petiolare</i> Dougl. | Wild black currant | Open | 2 | 1 | 41 | 3 | 250 |
| | | Part-shade | 2 | 1 | 64 | 5 | 585 |
| | | Shade | 2 | 1 | 74 | 2 | 169 |
| <i>R. roezlii</i> (Regel) | Sierra gooseberry | Open | 1 | 2 | 39 | 2 | 106 |
| | | Part-shade | 1 | 2 | 1887 | 7 | 257 |
| <i>R. sanguineum</i> Pursh. | Red-flowering currant | Open | 6 | 19 | 216 | 4 | 187 |
| | | Part-shade | 5 | 4 | 64 | 4 | — |
| | | Shade | 3 | 4 | 50 | 2 | 30 |
| <i>R. sanguineum</i> (Oregon Caves ¹) | Red-flowering currant | Part-shade | 3 | 1 | 205 | 1 | 2 |
| <i>R. sativum</i> (Rohbch.) Syme ² | Cultivated red currant | Open | 5 | 14 | — | 1 | 12 |
| <i>R. setosum</i> Lindl. | Bristly-stemmed gooseberry | Open | 2 | 1 | 48 | 1 | 24 |
| <i>R. velutinum</i> Greene | Desert gooseberry | Part-shade | 3 | 3 | 136 | 5 | 554 |
| <i>R. viscosissimum</i> Pursh. | Sticky currant | Open | 3 | 2 | 169 | — | — |
| | | Part-shade | 3 | — | — | — | — |
| | | Shade | — | — | — | — | — |
| <i>Ribes</i> spp. ³ | Cultivated gooseberry | Open | 3 | 11 | 118 | 5 | 504 |
| Totals | | 51 | | | 12372 | | 9674 |

¹One test constitutes the periodical examination on one plant over a period of one season.

²Two distinct varieties of *R. klamathense* were tested—one from the Klamath Lake vicinity and the other from the Prospect vicinity of southern Oregon.

³The southern Oregon variety of *R. sanguineum* is atypical of the species.

⁴Probably several varieties of *R. sativum* and *R. vulgare* Lam. were tested.

⁵Species undetermined.

ranges, and figures given in this paper for susceptibility and telia production are averages determined from the combined bases of the various localities.

RESULTS

The infection data secured on ribes in the West since 1921 in British Columbia and Oregon are summarized in Tables 2 and 3. Table 2 classifies the species and forms in order of their susceptibility to infection, and Table 3 classifies them in order of their telium-producing capacity.

DISCUSSION

The figures given in Tables 2 and 3, for percentage of total lower leaf surface infected and total lower leaf surface bearing telia are averages determined from the data secured under conditions characterized by heavy infection.

The relative places, of species and forms of species in Tables 2 and 3 which do not have percentage figures, were determined by evaluating them in respect to the species and forms which do have percentage figures, where both were studied under the same conditions characterized by light infection. Species and forms of species on which few or no data were available were not included in the tables.

The basis of data secured under conditions characterized by heavy infection was exceedingly small for *Ribes nigrum*. Because of the diversity of individual bush susceptibility, the total basis for this species was used to estimate the figures, in Tables 2 and 3, for percentage of total lower leaf surface infected and bearing telia.

The southern Oregon species, which in-

clude *Ribes klamathensi*, *R. marshallii*, *R. cruentum*, *R. binominatum*, *R. velutinum*, *R. erythrocarpum*, *R. hallii*, and the Oregon Caves variety of *R. sanguineum*, were tested under conditions characterized by heavy infection in 1932 and 1935. The moisture conditions during 1932 were exceptionally favorable for rust development and the resulting infection⁸ was above normal on these species as well as on all other species in the West, while the rust development during 1935 was about average. For that reason the figures for percentage of total lower leaf surface infected and bearing telia, in Tables 2 and 3, were computed from the 1935 infection data only. *R. velutinum* was not tested in 1935; therefore no figures are given for it, but it has been placed in the scale (Tables 2 and 3) by evaluating it in respect to the other southern Oregon species which were tested in the same planting with *R. velutinum* from 1931 to 1934, inclusive.

The southern Oregon species,⁹ and the California species¹⁰ (*Ribes nevadense* and *R. roezlii*), were tested in plantings far north of their natural ranges. The more favorable weather conditions for rust development at these plantings undoubtedly caused a greater amount of initial infection and intensification on these species than would normally have occurred in their natural habitat. It is probable, therefore, that these species will be lower in the scale (Tables 2 and 3) when they are tested in situ.

A ribes species is limited, by the existing climatic conditions and other factors, in the maximum amount of infection it will support and telia it will produce.

Of the 51 species and forms included in this study, *Ribes nigrum* is the most susceptible and greatest producer of telia,

⁸Kimme, J. W. Susceptibility of principal ribes of southern Oregon to white pine blister rust. Jour. For. 33:52-56. 1935.

⁹Kimme, J. W. Op. cit. Idem.

¹⁰Mielke, J. L., and J. R. Hansbrough. Op. cit.

TABLE 2
SPECIES AND FORMS IN ORDER OF THEIR SUSCEPTIBILITY TO INFECTION UNDER CONDITIONS CHARACTERIZED
BY HEAVY INFECTION

| Ribes species | Form | Total lower leaf surface | | Infected |
|--|------------|--------------------------|---------------|-------------------------------------|
| | | Infected | Bearing telia | Infected leaf surface bearing telia |
| | | Per cent | Per cent | Per cent |
| nigrum | Open | 65.0 ¹ | 60.0 | 92.3 |
| roezlii ² | Part-shade | 47.6 | 0.1 | 0.2 |
| roezlii ² | Open | 45.7 | 0.5 | 1.1 |
| petiolare | Part-shade | 36.1 | 35.6 | 98.6 |
| petiolare | Shade | 34.8 | 32.7 | 94.0 |
| bracteosum | Part-shade | --- | --- | --- |
| divaricatum | Part-shade | 33.0 | 23.6 | 71.5 |
| klamathensi (Klamath Lake ²) | Part-shade | 32.9 | 29.6 | 90.0 |
| marshallii ² | Part-shade | 32.2 | 27.4 | 85.1 |
| cruentum ² | Part-shade | 31.9 | 27.1 | 85.0 |
| binominatum ² | Part-shade | 31.7 | 30.1 | 95.0 |
| sanguineum (Oregon Caves ²) | Part-shade | 31.6 | 21.8 | 69.0 |
| klamathensi (Prospect ²) | Part-shade | 31.4 | 30.1 | 96.0 |
| velutinum ² | Part-shade | --- | --- | --- |
| erythrocarpum ² | Part-shade | 30.9 | 21.7 | 70.2 |
| sanguineum | Part-shade | 30.7 | 19.0 | 61.9 |
| bracteosum | Shade | 30.5 | 28.6 | 93.8 |
| divaricatum | Shade | 27.4 | 22.5 | 82.1 |
| nevadense ² | Part-shade | 27.4 | 22.3 | 81.4 |
| nevadense ² | Open | 26.0 | 18.0 | 69.2 |
| sanguineum | Shade | --- | --- | --- |
| sanguineum | Open | 23.3 | 11.6 | 49.8 |
| inermis | Shade | 23.0 | 18.7 | 81.3 |
| petiolare | Open | 22.6 | 20.3 | 89.8 |
| inermis | Part-shade | 22.4 | 18.8 | 83.9 |
| bracteosum | Open | --- | --- | --- |
| aureum | Shade | --- | --- | --- |
| laxiflorum | Part-shade | --- | --- | --- |
| laxiflorum | Shade | --- | --- | --- |
| niveum | Open | --- | --- | --- |
| viscosissimum | Part-shade | --- | --- | --- |
| lobbii | Part-shade | --- | --- | --- |
| inermis | Open | 13.9 | 4.9 | 35.3 |
| irriguum | Open | --- | --- | --- |
| viscosissimum | Shade | 11.5 | 7.3 | 63.5 |
| hallii ² | Part-shade | 10.5 | 4.2 | 40.0 |
| divaricatum | Open | 9.5 | 3.8 | 40.0 |
| lacustre | Shade | 8.8 | 2.4 | 27.3 |
| setosum | Open | --- | --- | --- |
| viscosissimum | Open | 6.3 | 3.4 | 54.0 |
| laxiflorum | Open | --- | --- | --- |
| lobbii | Open | --- | --- | --- |
| lacustre | Part-shade | 4.5 | 0.8 | 17.8 |
| lacustre | Open | 3.5 | 0.4 | 11.4 |
| cereum | Shade | --- | --- | --- |
| acerifolium | Part-shade | --- | --- | --- |
| acerifolium | Open | --- | --- | --- |
| sativum | Open | --- | --- | --- |
| americanum | Open | --- | --- | --- |
| cultivated gooseberry | Open | --- | --- | --- |
| cereum | Open | 0.1 | 0.09 | 90.0 |

¹The figures for *nigrum* for percentage of total lower leaf surface infected and bearing telia are not actually computed values based on data secured under conditions characterized by heavy infection, but are estimates based on lighter rust infection conditions, some of which gave values as great as those given in the table for this species.

²The southern Oregon and California species were tested out of their native ranges, therefore their position in the scale is only tentative until they can be tested in their natural habitat.

while the open form of *R. cereum* is the most resistant and lightest producer of telia.

In Tables 2 and 3 it is shown that in general species and forms with high percentages of total lower leaf surface infected also had high percentages of total lower leaf surface bearing telia. Where all three forms of a species were studied it was found that in most cases the part-shade form (and less often the shade form) was the most susceptible and generally produced the most telia.

There is a tendency for species and forms with high percentages of total lower leaf surface infected also to have high percentages of this infected surface bearing telia, and vice versa. In certain cases, however, this relationship does not hold. (See, for example, *R. roezlii* and *R. cereum* in Table 2.) The percentage of the infected surface that bears telia is relatively low in *Ribes lacustre*, *R. viscosissimum*, and *R. sanguineum*. This limitation of the percentage of infected surface bearing telia is a general characteristic of the more resistant species and forms which is clearly manifested by a comparison of the open or generally more resistant forms with the part-shade and shade forms of the same species. In most cases the percentage of the infected surface bearing telia is decidedly higher in the last two forms.

This failure of the infected surface to bear telia is caused primarily by necrosis of the infection spots before telia can be produced. Such necrosis varies seasonally and is most acute in dry seasons, particularly on the open forms. Aside from necrosis of the spots, telium production is also extensively reduced at times in the more susceptible species and forms by premature defoliation resulting from very heavy infection or from exceptional

susceptibility to killing of the leaves by rust. The last two factors were those primarily responsible for the extremely low telium production in *Ribes roezlii*. This species, however, was tested out of its natural range,¹¹ and there are indications from greenhouse experiments now in progress that the percentage of infected leaf surface bearing telia might be much higher under its native growing conditions.

It was frequently observed that some infections on ribes leaves produced telia without first producing uredia. This was particularly true of infections originating late in the season from uredial intensification of the rust. This type of development had no significant effect on the amount of telia produced. Such development has been observed in other rusts.¹²

Only those infections on the lower leaf surface were considered in the studies herein reported, although infections were sometimes found on other parts of the ribes plants. Such infections, while usually rather exceptional and numerically negligible, are noteworthy because they indicate that some parts of the plants other than the lower leaf surface are susceptible to infections. On all species studied infections bearing telia were found on the leaf petioles. Petiole infections are not uncommon on *Ribes binominatum*, *R. cruentum*, *R. erythrocarpum*, and *R. lacustre*. Petiole infections are probably more common on this last species than on any other studied in the West. Infections bearing telia were noted on the upper leaf surface of *R. cereum*, *R. lacustre*, and *R. aureum*. In each case, however, these infections originated on the under side of the leaf and sori were pushed through to the upper surface. Occasional infections were found on fruits

¹¹Mielke, J. L., and J. R. Hansbrough. Op. cit. Idem.

¹²Arthur, J. C. The plant rusts (Uredinales). John Wiley and Sons, Inc., New York. 1929. p. 243.

TABLE 3

SPECIES AND FORMS IN ORDER OF THEIR TELIUM-PRODUCING CAPACITY UNDER CONDITIONS CHARACTERIZED BY HEAVY INFECTION

| Ribes species | Form | Total lower leaf surface | | Infected |
|--|------------|--------------------------|----------|---------------|
| | | Bearing telia | Infected | bearing telia |
| | | Per cent | Per cent | Per cent |
| nigrum | Open | 60.0 ¹ | 65.0 | 92.3 |
| petiolare | Part-shade | 35.6 | 36.1 | 98.6 |
| petiolare | Shade | 32.7 | 34.8 | 94.0 |
| bracteosum | Part-shade | --- | --- | --- |
| klamathensi (Prospect ²) | Part-shade | 30.1 | 31.4 | 96.0 |
| binominatum ² | Part-shade | 30.1 | 31.7 | 95.0 |
| klamathensi (Klamath Lake ²) | Part-shade | 29.6 | 32.9 | 90.0 |
| bracteosum | Shade | 28.6 | 30.5 | 93.8 |
| marshallii ² | Part-shade | 27.4 | 32.2 | 85.1 |
| cruentum ² | Part-shade | 27.1 | 31.9 | 85.0 |
| divaricatum | Part-shade | 23.6 | 33.0 | 71.5 |
| divaricatum | Shade | 22.5 | 27.4 | 82.1 |
| nevadense ¹ | Part-shade | 22.3 | 27.4 | 81.4 |
| sanguineum (Oregon Caves ²) | Part-shade | 21.8 | 31.6 | 69.0 |
| erythrocarpum ² | Part-shade | 21.7 | 30.9 | 70.2 |
| petiolare | Open | 20.3 | 22.6 | 89.8 |
| sanguineum | Part-shade | 19.0 | 30.7 | 61.9 |
| inermis | Part-shade | 18.8 | 22.4 | 83.9 |
| inermis | Shade | 18.7 | 23.0 | 81.3 |
| nevadense ² | Open | 18.0 | 26.0 | 69.2 |
| sanguineum | Shade | --- | --- | --- |
| velutinum ² | Part-shade | --- | --- | --- |
| sanguineum | Open | 11.6 | 23.3 | 49.8 |
| bracteosum | Open | --- | --- | --- |
| aureum | Shade | --- | --- | --- |
| laxiflorum | Shade | --- | --- | --- |
| laxiflorum | Part-shade | --- | --- | --- |
| niveum | Open | --- | --- | --- |
| viscosissimum | Part-shade | --- | --- | --- |
| viscosissimum | Shade | 7.3 | 11.5 | 63.5 |
| lobbii | Part-shade | --- | --- | --- |
| inermis | Open | 4.9 | 13.9 | 35.3 |
| irriguum | Open | --- | --- | --- |
| hallii ² | Part-shade | 4.2 | 10.5 | 40.0 |
| divaricatum | Open | 3.8 | 9.5 | 40.0 |
| viscosissimum | Open | 3.4 | 6.3 | 54.0 |
| lacustre | Shade | 2.4 | 8.8 | 27.3 |
| setosum | Open | --- | --- | --- |
| laxiflorum | Open | --- | --- | --- |
| lobbii | Open | --- | --- | --- |
| lacustre | Part-shade | 0.8 | 4.5 | 17.8 |
| roezlii ² | Open | 0.5 | 45.7 | 1.1 |
| lacustre | Open | 0.4 | 3.5 | 11.4 |
| cereum | Shade | --- | --- | --- |
| acerifolium | Part-shade | --- | --- | --- |
| acerifolium | Open | --- | --- | --- |
| sativum | Open | --- | --- | --- |
| americanum | Open | --- | --- | --- |
| cultivated gooseberry | Open | --- | --- | --- |
| roezlii ² | Part-shade | 0.1 | 47.6 | 0.2 |
| cereum | Open | 0.09 | 0.1 | 90.0 |

¹See footnote 1, Table 2.²See footnote 2, Table 2.

and floral bracts of *R. sanguineum*. Telia have been observed on peduncles of *R. lacustre*, and *R. sanguineum*, and on the rachises of *R. petiolare*. Two infections on branch stems of current season's growth were found on a plant of *R. petiolare*. There was no evidence of infection on the bark of these stems the following season, indicating that overwintering did not occur.

Bud scales and unopened buds of *Ribes lacustre*, *R. petiolare*, and *R. viscosissimum* were inoculated with aeciospores, but no infection resulted.

SUMMARY

Tests of the susceptibility and telium-producing capacity of ribes species in the West have been made over a period of fifteen years in British Columbia and Oregon. A total of 22,046 tests were made on 51 ribes species and forms.

Where possible tests were made of naturally grown ribes exposed to infection from adjacent naturally grown pines producing an abundance of aeciospores. For some species this was impossible; therefore it was necessary to simulate epidemic conditions by artificial inoculations.

California and southern Oregon species were transplanted in test plots within the known range of the disease to prevent introducing the rust into rust-free areas.

Test plants of each species were classified as being open form, part-shade form, or shade form, and data were kept separate throughout the study.

The various species and forms are listed first in order of their susceptibility to infection and second in order of their ability to produce telia.

Generally, the more susceptible species and forms produced the more telia and vice versa. In most cases, within a single species, the part-shade form (and less often the shade form) was the most susceptible and generally produced the most telia, while the open form was the most resistant and generally produced the fewest telia. Of the species tested *Ribes nigrum* was the most susceptible and produced the most telia, and the open form of *R. cereum* was the most resistant and produced the least telia.

The percentage of infection that bore telia had a tendency to be greater on the more susceptible species and forms, and vice versa; however, this relationship did not hold true in certain cases.



CAREERS IN FORESTRY

MISCELLANEOUS Publication 249, *Careers in Forestry*, has recently been issued by the U. S. Forest Service. It may be obtained for 5c from the Superintendent of Documents, Government Printing Office, Washington, D. C.

BLISTER RUST DAMAGE TO MERCHANTABLE WESTERN WHITE PINE

By T. S. BUCHANAN¹

*Division of Forest Pathology, Bureau of Plant Industry*²

Damage to and the death of young western white pine through blister rust attack has been noted for some time in British Columbia and studies there have indicated that further damage will take place. Within the last few years similar damage has become apparent in various areas in Idaho. Information as to what may happen to western white pine of merchantable size, an extremely important consideration from the lumberman's standpoint, has not been previously available. This paper presents the results of two studies of damage to merchantable western white pine, one in British Columbia and the other in Idaho, as an indication of what blister rust may do in larger trees.

WHITE pine blister rust (*Cronartium ribicola*) is capable of seriously injuring or even destroying stands of young western white pine (*Pinus monticola*), as has been amply demonstrated by various studies in British Columbia (1, 5, 6). In recent years the death of young trees in several localities in Idaho has shown even the most skeptical that significant losses will result when young stands are exposed to the disease. Clear-cut instances of blister rust damage even to individual trees of merchantable size in commercially mature stands of western white pine have not been previously reported in publication. This paper presents the results of studies showing that mature trees of this species can be damaged by blister rust. The largest western white pine heretofore reported in publication as having cankers present which would eventually either kill it or impair its merchantability was only 95 feet in height at the time of infection (3), and the largest tree of this species

known to have been killed by the rust was only 75 feet high and was located in an area of exceptionally heavy infection (5).

Even among other native pine species very large trees have not been reported as damaged by the rust. Filler (2), in his study of *Pinus strobus* in Vermont was not concerned with trees over 80 feet high.³ Posey and Ford (7) reported damage in a stand containing trees more than 13 inches d.b.h. but did not indicate the size classes in which damage occurred. Snell (8) did not discuss tree sizes as such in his studies in the Adirondacks, but he found no trees dead or dying that were over 30 years of age at time of infection. This should not be interpreted to mean that damage cannot take place in older trees but simply that none was found in the lots studied. In Europe, Spaulding (9) observed trees of *Pinus strobus* up to 118 years of age which were plainly dying or had been recently killed by blister rust.

¹The author is indebted to J. S. Boyce and H. G. Lachmund, formerly of the Division of Forest Pathology, who initiated and directed the study herein reported; to C. N. Partington, formerly of that same division, who assisted in the field work in British Columbia; and to G. H. Englerth and J. W. Kimmey, of the Division of Forest Pathology, who assisted on the field work in Idaho. Acknowledgments are also extended to Potlatch Forests, Inc. and to the Milwaukee Land Company for granting permission to cut trees on their lands for the conduct of the study in Idaho.

²Maintained at Portland, Oreg., in cooperation with the U. S. Forest Service.

³The plots studied apparently contained no trees above this height. It must be realized, however, that an eastern white pine of this size is comparatively larger than a western white pine of the same height, the former species not attaining as great heights as the latter.

The possibility of damage to merchantable trees and stands is of more direct concern to lumbermen, especially those who plan to cease operations after liquidation of their present holdings, than are losses in reproduction. Not that losses in the latter case are necessarily less important, but their financial aspects are certainly not as immediately evident. Where very young, overstocked stands of reproduction are exposed to infection for only a limited period followed by the early removal of ribes, the reduction in numbers of young trees through blister rust attack may conceivably have the effect of a beneficial thinning. The ribes distribution is commonly such, however, that tree killing occurs in groups rather than evenly scattered through the stand, in which case the thinning is not so distributed as to be advantageous. Damage to any individual in a merchantable stand, however, generally involves a definite reduction in present cash value. Timber owners and control agencies within the white pine belt of the Inland Empire (northern Idaho, western Montana, and northeastern Washington) have, therefore, been interested in learning what damage blister rust might conceivably do to trees of merchantable size and to what extent control measures will be required to protect stands containing such trees from injury by blister rust.

In 1927 the Division of Forest Pathology⁴ made a study of western white pine of merchantable size in rust-infested areas in British Columbia, there being no suitable areas known within the Inland Empire at that time. In 1936 another study was conducted on a few large trees near Pierce, in Clearwater County, Idaho for comparison with the British Columbia results. The significant findings of these two studies are presented as an indication of the degree of injury that may be anticipated from blister rust in merchant-

able western white pine exposed to favorable infection conditions.

TYPES OF INJURY

Blister rust infection of the pine host takes place through the needles. The resultant canker continues to grow and develop in the bark (the merchantability of the wood is not affected) of the infected portion for some time and under favorable conditions may eventually reach the bole. A girdling action results in the death of those tissues whose food supply is thus cut off by the canker. Injury to a tree may thus result from either or both of two types of infections: (1) Simple twig or branch infections which kill only these small portions and which are an important factor in the life of the tree only when occurring in very large numbers; and (2) Infections that eventually enter and girdle the main bole causing the death of the entire crown above that point.

Infections of the first type sometimes become sufficiently numerous to result in the death, or at least in reduced vigor of the tree through the killing of individual branches or branch tips. No method is now known whereby the time required for injury from this source can be predicted, but it is self-evident that very heavy infection would have to be present, especially in larger trees, before sufficient branches or twigs would be killed to cause injury or death from starvation.

A knowledge of canker growth rates and general behavior of the rust, however, makes it possible to predict the time required for injury to result from those cankers which will eventually reach and girdle the bole. If such cankers enter at, or near the base of the crown the entire tree is killed soon after the bole is girdled. When such cankers enter the bole well above the base of the crown all parts

⁴Formerly the Office of Forest Pathology.

above that point are killed. Such injury not only greatly reduces the volume of foliage, thus lowering the vigor of the tree and hence also the increment, but exposes the tree to attack by trunk-rotting fungi and increases the fire hazard. What may at first appear to be only injury (dead top) may eventually become death through continued downward growth of the canker after it has girdled the bole. It is in the consideration of injury resulting from cankers girdling the bole that the term damage is used throughout the remainder of this paper although the effect of simple defoliating cankers has not been completely ignored.

STUDY AREA DESCRIPTIONS

In the British Columbia study two areas were selected in native white pine stands containing merchantable timber near Garibaldi (formerly Daisy Lake) about 22 miles inland from the head of Howe Sound. These areas contained 5.4 acres and 2.0 acres, respectively, and trees between 100 feet and 160 feet in height were well represented. Both areas were located on a level valley floor where the principal ribes were the commonly occurring prickly currant (*Ribes lacustre*) and the far less abundant coast black gooseberry (*R. divaricatum*). To further increase the basis in larger size-classes 30 trees above 50 feet in height were examined on another area containing 4.9 acres on a flat near Brackendale, about 8 miles from the head of Howe Sound. The main sources of infection on this area apparently were dense concentrations of stink currant (*R. bracteosum*), coast black gooseberry, and prickly currant which occurred along the Squamish River over 100 yards from most of the trees on the plot. The stands on all three areas were similar in composition, western white pine predominating with lesser amounts of Douglas fir and western hemlock intermingled.

The shrubby and herbaceous cover was relatively sparse on all areas.

Blister rust apparently first invaded this general locality in 1913 and by 1917 and 1918 had become generally established on pines. By 1924 the rust had intensified to such an extent that it could be found on almost any white pine and in more favorable areas actual death of smaller trees had occurred.

In the Idaho study only 12 trees ranging from 66.4 feet to 192.7 feet in height were selected for examination. These trees were in a relatively open stand on a small flat bordering Brown's Creek near Pierce, in Clearwater County. Associated conifers were white fir, western red cedar, Engelmann spruce, and Douglas fir in order of abundance. The underbrush and smaller cover were sparse, but the wild black currant (*Ribes petiolare*) had been very abundant along the stream prior to chemical eradication in September 1933. Lesser amounts of the prickly currant and an occasional sticky currant (*R. viscosissimum*) had also been present.

Blister rust infection definitely was not present on pines in this area prior to 1923, and infection did not become general on the trees examined until after 1927. Since ribes on the area were eradicated in the fall of 1933 these pines were exposed to appreciable infection for a period of only 6 years.

FIELD PROCEDURE

The field procedure was essentially the same on all four areas. The individual trees were carefully examined for total cankers, irrespective of date of origin, and for cankers that were calculated to eventually reach the bole and damage the tree. On the two areas near Garibaldi all pines in the stand were examined by climbing. Climbing was also employed at Brackendale, but only 30 trees in the larger size classes were examined. The

details of the Idaho study differed in that the trees were felled and examination made as the branches were cut off. This method was considered to give equally reliable data on the probable development of damage cankers and more reliable data on the total number of cankers present than had been secured in the British Columbia study.

Estimates, based on other rust studies (4) and the general familiarity of the investigators with canker development, were made of the eventual effect of those cankers which had entered or would enter the bole of the tree. These estimates, when considered along with the position of the canker in the crown, made it possible to designate the probable number of years required for such cankers to cause damage to or the death of the tree. In no case did the investigators consider non-enter cankers to be sufficiently numerous or so strategically located as to eventually cause the death of any of the larger trees.

RESULTS AND DISCUSSION

For the purpose of this paper the results of the examinations of the three British Columbia areas are considered as a unit. Although differences in detail were present the primary object is to show what may happen in the trees *after* the cankers are once formed in

TABLE 1
BLISTER RUST INFECTION PRESENT AND PROBABLE DAMAGE RESULTING FROM GIRDLING OF THE BOLES IN STANDS OF WESTERN WHITE PINE CONTAINING MERCHANTABLE TREES IN BRITISH COLUMBIA

| Tree data | | | | Infection data | | | | | Estimated years until damaged ¹ | | | | | |
|--------------------------|-------|-------|--|-------------------------|--------------------------------|-------------------------------|------------------------|---------------------|--|----------|----------------------|-------|--------|----|
| Ht. class <i>Feet</i> | Basis | | Size of average tree (at time of examination) | | | Trees infected | | Cankers per tree | | | | | | |
| | Areas | Trees | Hr. <i>feet</i> | D.b.h. <i>Inches</i> | Crown length <i>feet</i> | Crown width <i>feet</i> | Trees to be damaged | | | | | | | |
| | | | | | | | No. | | | Per cent | Per cent of total | Total | Damage | |
| 5.0-10.0 | 1 | 7 | 6.9 | .7 | 3.6 | 4.0 | 7 | 100 | 4 | 57 | 3.0 | 1.0 | 33.3 | 4 |
| 10.1-20.0 | 2 | 26 | 16.8 | 2.3 | 8.1 | 6.0 | 21 | 81 | 9 | 35 | 4.8 | .8 | 17.6 | 5 |
| 20.1-30.0 | 2 | 29 | 27.1 | 3.9 | 12.2 | 7.7 | 25 | 86 | 15 | 52 | 8.4 | 1.3 | 16.0 | 7 |
| 30.1-40.0 | 2 | 39 | 37.0 | 4.5 | 16.5 | 7.5 | 37 | 95 | 21 | 54 | 8.9 | 1.9 | 21.0 | 7 |
| 40.1-50.0 | 3 | 57 | 47.0 | 5.7 | 21.7 | 8.6 | 56 | 98 | 37 | 65 | 12.2 | 2.1 | 17.4 | 8 |
| 50.1-60.0 | 3 | 44 | 57.3 | 6.9 | 24.0 | 8.9 | 43 | 98 | 27 | 61 | 11.7 | 1.7 | 14.6 | 9 |
| 60.1-70.0 | 2 | 35 | 67.4 | 7.6 | 29.7 | 9.0 | 35 | 100 | 23 | 66 | 12.1 | 1.9 | 15.6 | 9 |
| 70.1-80.0 | 3 | 41 | 77.3 | 8.5 | 32.4 | 10.1 | 41 | 100 | 22 | 54 | 12.3 | 1.8 | 14.3 | 9 |
| 80.1-90.0 | 3 | 45 | 87.0 | 10.4 | 38.0 | 10.1 | 43 | 96 | 27 | 60 | 16.3 | 2.0 | 12.3 | 13 |
| 90.1-100.0 | 3 | 31 | 96.8 | 11.3 | 45.3 | 10.5 | 30 | 97 | 17 | 55 | 12.5 | 2.3 | 18.3 | 14 |
| 100.1-110.0 | 3 | 26 | 107.2 | 15.0 | 53.5 | 13.6 | 25 | 96 | 15 | 58 | 17.3 | 2.5 | 14.7 | 14 |
| 110.1-120.0 | 3 | 35 | 117.4 | 17.8 | 58.9 | 13.3 | 33 | 94 | 19 | 54 | 18.7 | 2.3 | 12.4 | 15 |
| 120.1-130.0 | 3 | 60 | 127.3 | 20.6 | 63.2 | 14.6 | 59 | 98 | 29 | 48 | 13.2 | 2.0 | 15.1 | 18 |
| 130.1-140.0 | 3 | 26 | 136.9 | 21.8 | 67.3 | 14.7 | 26 | 100 | 17 | 65 | 10.8 | 2.0 | 18.2 | 17 |
| 140.1-150.0 | 3 | 24 | 147.3 | 23.4 | 69.4 | 15.4 | 24 | 100 | 15 | 63 | 8.9 | 1.3 | 15.0 | 18 |
| 150.1-160.0 | 2 | 9 | 157.2 | 26.7 | 83.3 | 16.8 | 9 | 100 | 4 | 44 | 12.6 | .9 | 7.1 | 20 |

¹From time of examination. Add 3-10 years for time since infection.

the crowns. The significant data for these three areas are summarized in Table 1.

The Idaho data were secured from obviously heavily infected trees, as evidenced by the presence of numerous dead branch tips, and hence they are summarized individually in Table 2. Cankers were much more plentiful on these trees than on those in British Columbia because of the generally higher susceptibility of the ribes involved combined with the more favorable ribes-pine association, and the percentage of cankers which would enter the boles was smaller because of the greater width of the crowns. Despite these differences, both Tables 1 and 2 clearly show that blister rust can attack and eventually damage even the largest white pines. The British Columbia data further show that the increase in total number of cankers with increasing tree size is sufficient to cause damage in the larger size classes approximately equal to, although longer deferred than the damage in associated smaller trees. Under favorable conditions for infection 50 per cent or more of the trees on a limited area may be damaged as the result of a relatively short period of exposure to the rust.

In lumbering practice operators are most directly concerned with the relation between size of tree and length of time required for damage. For the British Columbia trees this relationship, as well as the average portion of crown to be lost through girdling of the bole within that time, is shown graphically in Figure 1. Since all measurements illustrated are averages it must be borne in mind that on some trees greater or lesser portions of the crown may be killed and in longer or shorter times than are shown. The time

TABLE 2

BLISTER RUST INFECTION PRESENT AND PROBABLE DAMAGE RESULTING FROM GIRDLING OF THE BOLES IN SELECTED MERCHANTABLE WESTERN WHITE PINE TREES IN IDAHO¹

| Tree No. | Tree data | | | | Infection data | | | |
|----------|--|--------|----------------|-------|-------------------------|---|--|--|
| | Size of tree (at time of examination) | | Crown width | Age | No. of cankers Total | Percentage of total cankers that will damage | Ht. of highest canker in tree | Minimum time (yrs) required for damage from time of |
| | Ht. | D.b.h. | | | | | | |
| | Feet | Inches | Feet | Years | | | Feet | Examination |
| 5 | 66.4 | 8.5 | 50.5 | 90 | 1102 | 1.0 | 60.8 | 7 |
| 10 | 80.0 | 11.2 | 66.0 | 75 | 925 | 2.5 | 69.4 | 5 |
| 11 | 141.5 | 23.6 | 101.2 | 50 | 1087 | 0.8 | 108.6 | 14 |
| 3 | 142.5 | 25.0 | 111.5 | 140 | 296 | 0.3 | 133.0 | 36 |
| 2 | 161.2 | 27.3 | 111.2 | 230 | 86 | 0.0 | 115.0 | 44 |
| 6 | 168.5 | 25.0 | 115.8 | 200 | 728 | 0.8 | 136.9 | 28 |
| 4 | 170.8 | 45.8 | 124.3 | 195 | 236 | 0.4 | 145.2 | 28 |
| 9 | 171.0 | 29.0 | 120.6 | 180 | 394 | 0.0 | 137.0 | — |
| 7 | 184.0 | 34.2 | 137.5 | 195 | 458 | 0.0 | 130.0 | — |
| 8 | 184.3 | 32.7 | 127.8 | 200 | 546 | 0.4 | 159.3 | 17 |
| 1 | 188.5 | 35.0 | 153.5 | 210 | 297 | 0.7 | 147.5 | 23 |
| 12 | 192.7 | 34.0 | 154.1 | 210 | 1300 | 0.0 | 160.7 | 30 |

¹Trees selected on the basis of obviously heavy infection, as indicated by the presence of numerous dead branch tips.

required for damage is expressed as number of years after examination. The youngest cankers found were already 3 years old and the oldest 10 years of age, hence an additional 3 to 10 years must be added to arrive at the total time from infection to damage.

Smaller trees are included here, as well as in Table 1, to show the trends with trees of different sizes. With the passage of time before girdling, crowns will be moving upward, usually to some extent even in large dominant trees. This will result, when girdling finally does occur, in the destruction of larger percentages of total foliage than are indicated by the black triangles in Figure 1. Downward growth of cankers subsequent to girdling will frequently involve the destruction of still more crown. Death of the entire tree will therefore be the eventual outcome of infection in many cases.

In the British Columbia studies prac-

tically all pine infection found occurred between 1917 and 1924. Since the examination was made in 1927 infection had developed for only between 3 and 10 years. In the Idaho study the bulk of the infection occurred subsequent to 1927. All ribes were eradicated in 1933, leaving a period of only 6 years during which the rust could have become established on the pines—almost the identical lapse of time over which the trees in British Columbia were exposed. The Idaho examination was made in 1936 and therefore the period of development was between 3 and 9 years—again almost identical with conditions on the British Columbia areas. On all areas, then, infection took place during a relatively few years and all tables and graphs consider only the probable effects of the cankers actually present at the time of examination. It seems logical to assume that since comparatively heavy damage is to

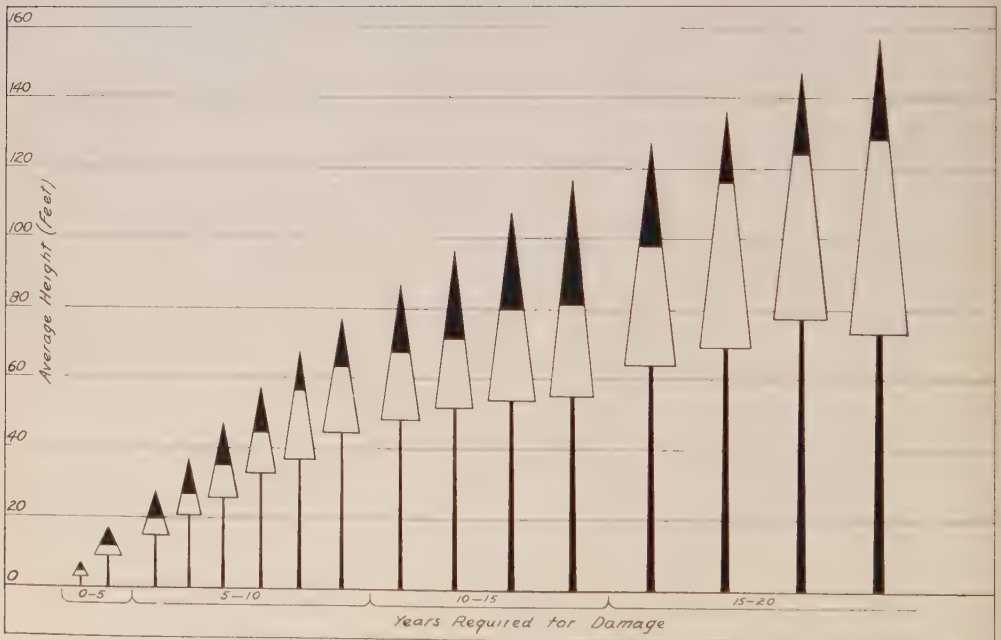


Fig. 1.—Blister rust damage to merchantable western white pine. Based on 534 trees on three areas in British Columbia. Trees drawn to scale in all dimensions. Black portion of crown to be killed by cankers girdling the bole. Damage given in years after examination—add 3 to 10 years for time after infection.

be suffered on all plots within a relatively few years and from a short period of exposure, continued exposure to rust on ribes will result in greater damage and probably in a shortening of the period required for the same.

CONCLUSIONS

From the combined studies the following conclusions may logically be drawn:

In stands of western white pine exposed to blister rust on associated ribes, infection takes place in even the largest trees.

This infection is sometimes sufficiently intense to cause damage in all sizes of trees by the girdling of the bole at a point low enough to result in the eventual death or deformation of the tree.

Damage to more than 50 per cent of the trees in a stand of limited areal extent may eventually result from a comparatively short period of exposure to ribes when favorable infection conditions are present.

The time required for damage varies with the size of the tree. Damage may occur within 5 years after infection in the smaller sizes while significant damage in merchantable trees may not occur until 30 or more years after infection. In general, the larger the tree the longer the period before damage.

The time required for damage may well be expected to be shortened by the dual action of new damage cankers and the increase in twig and branch infections if the trees continue to be exposed to ribes infected with white pine blister rust.

SUMMARY

To procure detailed data on the nature of white pine blister rust infection and probable damage to merchantable trees in stands of western white pine the Division of Forest Pathology examined three infested areas in British Columbia in 1927. A total of 534 trees, ranging from 5.0 to

160.0 feet in height, constituted the basis. To make possible the comparison of these results with Inland Empire conditions 12 infected trees were critically examined in 1936 in the Clearwater region of Idaho.

Measurements of each tree were made including d.b.h., height, crown length, and crown width. For the Idaho trees age was also recorded. An examination was made of each tree to determine the total number of infections present. For each canker considered likely to enter the bole, an estimate was made of the time required for damage to ensue.

The results of these combined studies show that infection may take place in the crowns of even the tallest trees. It is further indicated that it is quite possible, under favorable infection conditions, for 50 per cent or more of the merchantable timber in a stand to eventually suffer damage from a relatively short period of exposure to blister rust infection on ribes. Even the largest trees may suffer damage but, in general, the larger the tree the longer will be the elapsed time between infection and damage.

The results of these studies are in no way intended as giving a cross-section of present infection conditions in mature stands of western white pine in the Inland Empire. On the contrary, the examination of but 12 obviously infected trees in the Clearwater region, in a localized area of extremely favorable infection conditions as are sometimes met with in the stream bottoms, merely indicates what *can* happen under more or less ideal conditions.

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FROST OFTEN ADDS TO SOIL EROSION ON STEEP SLOPES

GULLYING, sheet erosion, and wind erosion are not the only processes responsible for soil losses, according to the U. S. Soil Conservation Service.

Frost often causes a considerable amount of soil damage. In freezing weather, particles of the surface soil on bare ground are often lifted on top of needle-like frost crystals which grow up from the surface of the ground. On fairly steep slopes the crystals have a tendency to break off near the base as they melt, and the soil particles which they carry then fall or roll a short distance downhill. In the course of a single winter the surface soil may be moved downhill in this way for a distance of several feet.

Another little-known type of erosion has been found on steep slopes where the surface soil is underlain by a slippery clay subsoil. When the ground becomes saturated, the soil sometimes slides or flows downhill, leaving the hillside rough and broken and in some cases exposing areas of subsoil or bedrock. This type of erosion is common in the upper Ohio Valley and many other parts of the country.

During prolonged hot, dry weather, evaporation sometimes removes so much of the moisture from steep exposed banks that they no longer have sufficient cohesion to stand at a high angle. The soil crumbles and falls away little by little, accumulating in a pile at the base of the slope.

None of these types of erosion is as severe when the soil is held by the roots of trees, shrubs, and grasses.

FOREST PLANTING UNDER THE HEWITT BILL

REPORT OF COMMITTEE ON TECHNICAL PRACTICES¹ NEW YORK SECTION, SOCIETY OF AMERICAN FORESTERS

During the last six and one-half years, the New York State Conservation Department has initiated on its Reforestation Areas one of the largest forest planting projects in the Nation. In all, over 134 million trees have been planted. The Committee on Technical Practices of the New York Section of the Society has made an analysis of the problems involved and the accomplishments of this large scale planting program.

FOREST planting under the Hewitt Bill actually began in the fall of 1929 under the supervision of state foresters. In the spring of 1930, five district foresters were secured, and in 1932 five additional men were appointed to newly created districts in other parts of the state. These men, in collaboration with the Albany office, had to work out the details of the program, and during the six and one-half year period have had to contend with a constantly changing personnel from hired labor at the start of the program to C.W.A., T.E.R.A., and lastly, C.C.C. workers. There has been little opportunity to build up a group of reliable experienced men, and each year, even between spring and fall operations, it has often been necessary to organize and train new crews of both laborers and foremen. Naturally this situation has not been conducive to as good planting results as might have resulted from stable labor conditions.

Planting began in the fall season of 1929. The total number of trees planted to date is shown in Table 1.

Due to the rapid development of the Hewitt program, the nurseries did not have available transplants of certain species during the years 1930, 1931, and 1932. Consequently many areas were planted with small 2-0 stock, especially of red pine and Norway spruce. Losses were reported by the various district foresters and they expressed a desire for more 2-1

and 2-2 transplants. It was the general consensus of opinion that transplants, being larger, had a better chance to become firmly established on areas covered with the rank growth usually found on abandoned farmland, except in some localities in western New York. In order to give small seedling stock every possible chance, sod removal was suggested and tried, but in some districts the losses from heaving seemed far greater than those from competition. However, it was necessary to use a certain amount of seedling stock in all districts each season. It must be borne in mind, however, that both 2-0 and 2-1 stock has constantly improved as a result of better nursery technique. Thus today, 2-0 stock of many species is not only far superior to 2-0 stock of 1930 and 1931, but it is equal and sometimes even better than 2-1 stock of those years. Therefore it is logical to expect that survivals during the past few years will be better than those of the first years of the program.

An analysis of the differences in yearly trend of ages of planting stock is shown in Figure 1. The three major age classes of stock are shown as well as the total trees planted each year. Disregarding the year 1929 because of the limited planting program of that year, this chart shows several changes in the program to date. In the years 1930, 1931, and 1932 seedling stock ranged from 34 to 59 per cent of the total, but during the period 1933

¹T. C. Luther, S. S. Hunt, J. D. Kennedy, and R. M. Hick, Chairman. Presented at the Annual Meeting, New York Section, Albany, N. Y., February 8, 1936.

to 1935, this class of stock did not exceed 20 per cent in any year. In 1933 70.5 per cent of the total planting stock was 2-1 transplants mainly because of the limited planting program that year. Thus 1933 might be considered the turning point in the program insofar as age of stock is concerned. Whereas 2-1 stock ranged from 21.7 to 32 per cent during the period 1930 to 1932, it jumped to between 45 and 70.5 per cent during the last three years. The chart further shows that the amounts of 2-2 stock have increased gradually since 1932. The column on the extreme right shows the averages for the program to date. Seedlings represent 27.5 per cent and 2-1 and 2-2 transplants combined represent 69.3 per cent of the total of over 134 million trees.

These differences in age of stock are accounted for by the fact that in the early years of the program (except for the limited planting in 1929), the nurseries were not prepared to meet such large demands for transplants, thus the number of seedlings used was far in excess of that of the other two classes; but as the program progressed, the older classes became available and have been largely used in the last three years. This does not mean that 2-0 stock is wholly undesirable, for it appears to be well adapted to certain sections of the state, but it is generally believed that 2-1 stock or older gives the best results. Whether this is true or not will be shown later.

Figure 2 shows the percentage of the

principal species planted each year, and the trends in the program up to 1935. The data are so presented that they may be compared for any year; thus by checking the year of planting, it is easy to discern the predominating species during any year of the program. Red or Norway pine led in 1929 and 1930; white pine in 1931; Norway spruce in 1932; and red pine each year thereafter.

During the past six years of planting, white pine has maintained a fairly constant percentage of the total trees planted each year, ranging from 10 to 29 per cent. Because this native pine has a high survival and a high commercial value, it might be desirable to increase the percentage of white pine in future years.

Scotch pine has been planted only to the extent of 4 per cent of the total number of trees planted. With better sources of seed available from localities with climatic conditions similar to New York State, it seems probable that Scotch pine will find a more extended use as a pioneer crop on the more difficult sites.

Red pine has maintained a dominant position in the program, averaging about one-third of the total trees planted to date. The preference for red pine is based in part on the belief that it is relatively free from disease and insect damage; however, the outbreak of the resinosis disease and the European pine shoot moth may cause some reduction in the amount of red pine planted in the future.

Norway spruce occupies second place in the total number of trees planted for all years. From year to year, the percentage of Norway spruce has been quite uniform and will probably continue to be so. However, it will be used principally in the southern districts. More careful attention should be given to the site selection for this species.

The number of white spruce planted has never been very large. Seven per cent of the total number of trees have

TABLE 1
FOREST PLANTING IN NEW YORK STATE UNDER
THE HEWITT BILL

| Year | Spring | Fall | Total |
|----------|------------|------------|-------------|
| 1929 | | 1,660,000 | 1,660,000 |
| 1930 | 3,583,090 | 1,774,829 | 5,357,919 |
| 1931 | 15,269,292 | 5,390,804 | 20,660,096 |
| 1932 | 22,121,114 | 3,208 | 22,124,322 |
| 1933 | 7,762,025 | 2,298,955 | 10,060,980 |
| 1934 | 27,178,542 | 10,703,890 | 37,882,432 |
| 1935 | 16,196,900 | 20,940,900 | 37,137,800 |
| Total | 92,110,963 | 42,772,586 | 134,883,549 |
| Per cent | 68.3 | 31.7 | 100.0 |

been of this species. However, a greater use is anticipated for areas north of the Mohawk Valley.

The percentage of European and Japanese larch, both of which should find a greater use in mixed plantings, has varied considerably in the past. Only 2 per cent of the total number of trees planted to date have been these larches. The rather limited period when this tree may be successfully planted, will never allow its use on a large scale.

Only small amounts of northern white cedar have been planted in the past and it is doubtful whether further use is justified except on special sites.

Balsam fir has been advocated for Christmas tree plantations and on sites where it grew naturally. The planting of this tree has not met with general success.

Slightly over 82 per cent of all plantings to date are of three major species, red pine, Norway spruce, and white pine.

Probably of most interest to foresters is the trend in hardwood plantings. Stock was first available in 1931 and although the percentage of such trees planted shows a drop from the peak of 1933, it is interesting to note that more hardwoods are planted each year. In 1935, in a total planting of over 37 million trees, hardwood species exceeded a million for the first time. These included black locust, red oak, white ash, and white oak. They are used mostly as "filler species" with

conifers, or on brushy areas where one would naturally find hardwood species affording some side competition.

In order to ascertain the survival of trees planted on reforestation areas, detailed examinations were made in the spring of 1932 followed by similar examinations each year. Their purpose was to show (1) a comparison of the survival of all species and classes of stock, and (2) differences in the survival due to different planting methods and time of planting. These counts also were deemed necessary for general information, and to determine, if possible, the causes of excessive mortality if and when it occurs.

Survival studies were made in the following manner: Counts were tabulated for separate planting blocks where it was thought that average site conditions existed. Fifty trees or blanks of each species were taken by counting five different rows of ten trees each, the rows being scattered over the block. Brief notes were taken on the planting method, exposure, aspect, density of cover, and also the principal species of vegetation listed according to their relative abundance. From this field data the survival percentages for each species were calculated, and from these percentages a weighted average was determined for each area.

All survival figures given in this report are those obtained usually after one growing season, or in the case of fall planting,

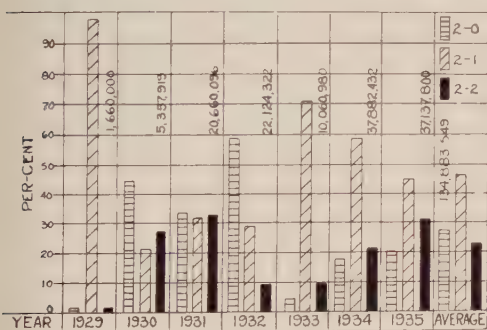


Fig. 1.—Percentage of age classes of planting stock by years of planting.

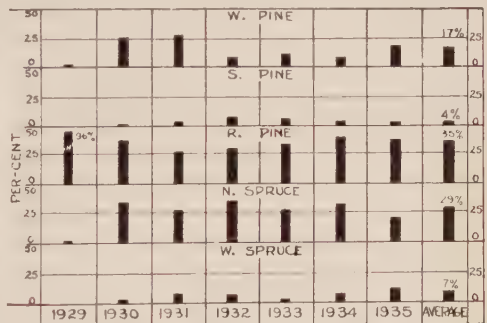


Fig. 2.—Percentage of principal species planted each year—1929 to 1935 inclusive.

one winter in the field. There may be some question of the reliability of the one-year counts; however, five-year counts taken on a number of areas have checked closely with the one-year counts. Figures included here cover Forest Districts 1 to 5, or that part of the state from Schoharie County westward to Chautauqua County through the southern section of the state. In these districts the survival may be said to be generally satisfactory. Higher survivals have been found in the eastern counties where more favorable site conditions prevail. The average of all species planted in these districts ranged from 70 to 80 per cent for plantations established from the fall of 1929 through the fall of 1933.

Several important qualifications must be borne in mind in considering survival figures by species and age classes during the above mentioned period, since they have a definite bearing on the survival of the trees planted.

1. During the first few years of the program large amounts of seedlings, too small for field planting, were shipped to the areas because the nurseries did not have available sufficient transplant stock.

2. Past seasons, both summers and winters, especially those of 1931 and 1932, have not been favorable for the survival of planted trees. Summer droughts and cold winters with no heavy snows have caused a considerable loss in these plantations.

3. When survival percentages are not grouped geographically, the poor survival of trees planted in the western counties tends to lower the general average of each species for all districts.

4. The number of samples taken in the field were limited by the time available for the work, and therefore, in many cases, no definite relationships can be established.

Table 2 shows the survival of different

species and age classes planted at different seasons.

The data in Table 1 show that:

1. Four-year transplants survived better than three-year transplants when both were planted during the spring. If planted in the fall, it appears that three-year transplants may come through equally as well as four-year transplants.

2. Three-year red pine and Norway spruce transplants have approximately the same survival as two-year seedlings of the same species (red pine—62.8 per cent as against 68.3 per cent; and Norway spruce 75.6 per cent as against 76.0 per cent respectively). For these two age classes of stock, the greatest contrast occurs in white spruce with a survival of 83 per cent for transplants and 68 per cent for seedlings.

3. The poor survival of European larch, planted both in the spring and in the fall, is correlated with the small size of the planting stock resulting from too high density in the seed beds. Much better larch stock is now being produced at the nurseries.

4. Balsam fir has not given a satisfactory survival. A special study which included nearly all plantations of this species, indicates that three-year transplants with a survival of 60.5 per cent were perhaps better suited to recover from the shock of field planting than four-year transplants which had an average survival of 37.6 per cent. The highest survival for this species was found on recent agricultural fields which showed evidences of fairly high fertility.

5. Of the two major hardwood species used, red oak and black locust, the former had a higher survival than the latter, being 85 per cent and 78 per cent respectively.

6. Spring planting has a somewhat higher survival than fall planting; however, districts where site conditions are favorable for either season of planting

from the standpoint of ground cover and exposure, the difference is not great enough to warrant a statement that one planting season is preferable to the other. Table 3 shows a comparison between the survivals of certain species of different age classes and two grub-hoe planting methods. One method removed the sod by scalping; the other did not. The data from sixteen areas were selected insofar as possible, so that the two methods were used on the same area. These areas are located in the counties of Schoharie, Otsego, and Chenango, and were planted in the spring of 1931 and 1932. The average survival for these areas ranged from 70 to 80 per cent; six were between 70-79 per cent, and ten between 80-88 per cent.

The indications are that in the two districts in question the mortality was about the same when the sod was removed as when it was left. However, this question can be answered finally only by a careful re-check of the survival after five or more growing seasons, when it should be pos-

sible to find every tree which formerly might have been tallied as missing.

Now for a word as to why more hardwoods are not being planted on reforestation areas. This question is constantly raised and is worth some explanation. Although hardwoods are easily grown in the nursery, present shipping and planting methods are not conducive to a high survival of hardwoods in the field. They are more exacting in their site requirements, and since only limited knowledge is available, it is next to impossible to recognize sites suitable for their best development.

A recent analysis of reforestation areas in an eastern district discloses that coniferous plantations occupy 52 per cent of the total area; the remainder being made up of volunteer stands of various ages, together with some mixed stands. There arises a question therefore whether any increase in the amount of hardwood planting is necessary. Natural seeding, some of excellent composition, along the edges of these volunteer stands is filling in many old fields. It appears then that hard-

TABLE 2

SURVIVAL OF DIFFERENT SPECIES AND AGE CLASSES PLANTED AT DIFFERENT SEASONS

| Species | Age | Spring | | Fall | |
|----------------------|-----|------------------------------|-------------------|------------------------------|-------------------|
| | | No. of counts of 50 trees | Average sum of | No. of counts of 50 trees | Average sum of |
| | | | <i>Per cent</i> | | <i>Per cent</i> |
| White pine | 2-2 | 32 | 89.2 | 6 | 79.5 |
| White pine | 2-1 | 25 | 78.8 | 2 | 87.1 |
| Scotch pine | 2-2 | --- | --- | 4 | 53.0 |
| Scotch pine | 2-1 | 22 | 78.5 | 3 | 70.5 |
| Red pine | 2-2 | 7 | 88.2 | 4 | 68.1 |
| Red pine | 2-1 | 9 | 62.8 | 9 | 70.8 |
| Red pine | 2-0 | 21 | 68.3 | 1 | 61.0 |
| Norway spruce | 2-2 | 5 | 84.6 | 6 | 82.0 |
| Norway spruce | 2-1 | 15 | 75.6 | 10 | 50.0 |
| Norway spruce | 2-0 | 19 | 75.0 | --- | --- |
| White spruce | 2-2 | 2 | 78.3 | 3 | 76.0 |
| White spruce | 2-1 | 6 | 83.3 | 3 | 67.3 |
| White spruce | 2-0 | 13 | 67.9 | --- | --- |
| European larch | 2-0 | 7 | 60.6 | 4 | 58.2 |
| Japanese larch | 2-0 | 1 | 94.0 | --- | --- |
| White cedar | 2-2 | 9 | 74.1 | 2 | 88.5 |
| White cedar | 2-1 | --- | --- | 1 | 65.9 |
| Balsam fir | 2-2 | 7 | 37.6 | --- | --- |
| Balsam fir | 2-1 | 5 | 54.7 | 1 | 76.0 |
| Black locust | 1-0 | 8 | 77.7 | --- | --- |
| Red oak | 1-0 | 3 | 85.1 | --- | --- |

woods might be best adapted to supplement such volunteer stands or to introduce more valuable species such as white ash and red oak in stands where they are lacking.

Direct seeding of black locust and other hardwoods has been tried extensively. Black locust had excellent germination and growth the first season, but it suffered badly from frost heaving the following spring. Sprouted red oak acorns have given good results when planted in furrows. White ash seed has been sown in woodlots where heavy slashing occurred.

Where hardwoods are to be planted on open land, at least three things must be done:

1. Plant only the most fertile sites where the type of soil and its physical condition is excellent.

2. Use some mechanical means of soil preparation.

3. The planting stock should be handled very carefully both in the nursery and the field.

Of the 134 million trees planted, 57½ million or 42.5 per cent were planted with C.C.C. labor. From all information at hand, this planting appears to be equal to, and in some cases better than that previously done by private labor. However, it should be understood that all of the work has been done under the careful supervision and direction of the various district foresters.

No definite conclusions as to future policies are drawn from the report. It has been prepared only to give an idea of what can be expected from a large-scale planting program spread from one end of the state to the other. As with any large program, more data should be collected and correlated with the many factors affecting the enterprise. Such a fact-finding agency is quite important in the initial stages of the program, when comparisons of the data collected for species already planted will assure improved planting techniques and survivals for the years ahead.

TABLE 3
THE INFLUENCE OF METHOD OF PLANTING ON SURVIVAL
Grub-hoe slit

| Species | Age | No sod removed | | Sod removed | |
|---------------------|-----|-----------------|-----------------------------|-----------------|-----------------------------|
| | | Survival | No. trees or blanks counted | Survival | No. trees or blanks counted |
| | | <i>Per cent</i> | | <i>Per cent</i> | |
| White pine | 2-1 | 89.1 | 450 | 89.3 | 150 |
| Scotch pine | 2-1 | 76.7 | 400 | 91.3 | 150 |
| Red pine | 2-1 | 82.5 | 200 | 78.0 | 50 |
| Red pine | 2-0 | 76.8 | 500 | 80.5 | 1,500 |
| Norway spruce | 2-1 | 79.5 | 750 | 82.0 | 100 |
| Norway spruce | 2-0 | 79.9 | 1,250 | 75.1 | 2,650 |
| White spruce | 2-1 | 85.0 | 350 | 83.3 | 150 |
| White spruce | 2-0 | 62.0 | 150 | 63.8 | 250 |



BRIEFER ARTICLES AND NOTES



THE CHIEF FORESTER'S REPORT

The Chief Forester, in his report to the Secretary of Agriculture, advocates a three-point program: (1) increase of public forests until the area exceeds that in private ownership; (2) extension of public cooperation with private owners in research and forest protection; (3) public regulation of management of private forest lands.

To support his conclusions, the Forester points to the drain upon our forests during the period 1925 to 1929. He should be well acquainted with these figures, which have been constantly in use now for more than seven years. There are far more significant figures available for later years, down to and including 1936; but they tell a different story, and tend to weaken the evidence supporting what appear to be among the Forester's most cherished convictions. It is generally known, of course, that since 1930, yearly growth of our forests has equalled or exceeded in wood volume the total annual cutting drain. This is interesting and encouraging to some foresters, although the fact that our people use much less lumber nowadays than formerly does not augur well for the future soundness of forestry as a business. These facts the report does not discuss.

Data selected to bolster what are evidently pre-determined conclusions are so presented as to glorify public ownership and public administration while discrediting private enterprise. There is no intimation that many of the obvious shortcomings of private forest management grow directly out of our continuing careless national "code of outdoor morals" and the apparently growing public disregard of ordinary property rights. These condi-

tions, of course, discourage long-time investments in forestry, and few will doubt that important current movements which have aggravated these conditions, if not fostered, at least have not been retarded, or even adequately controlled, by the national government. It is not made clear that the most serious defect in public cooperation for research and forest protection is the failure of state legislatures and the Congress to supply adequate funds. Such facts are known to public and private foresters alike; but they do not appear in this report.

The document contains a foreword, "Our Forest Lands," which evidently is intended as a key to the Forester's message. This foreword is studded with half-truths; it contains a few statements in which the range of accuracy is even less. It is somewhat unique as an *ex parte* background picture of Uncle Sam's forest establishment and of private misconduct, before which Forest Service administration and public ownership generally are made to shine. Our public, the foreword shows, owns but thirty per cent of our forest lands, and they generally the poorest; all but five per cent of public lands are receiving adequate protection from fire, while only fifty-five per cent of all private lands are protected; from 1925 to 1929, forest drain in the United States exceeded growth by about two to one in all sizes, but about five to one in saw timber sizes, "*though the difference is not now so great*"; yet of all potential forest growth, some nine-tenths is upon privately-owned lands, while one-tenth is on publicly-owned lands; forest fires still burn, each year, forty-odd million acres in private ownership and less than half a million acres in public ownership.

Some of the assertions made in the

foreword are considerably modified by explanation in the body of the Forester's report itself. Others are not. One is moved to inquire why even five per cent of public lands should be without adequate protection—why, for example, the federal public domain, and much of the newly acquired "resettlement" lands, and some of the National Parks, should be inadequately protected? The answer, of course, is well-known; and while it does not directly reflect discredit upon the Forest Service, it does weaken the legend of government forestry infallibility. Then there is the statement that forest fires burn, each year, forty-odd million private acres and less than one-half million public acres. Actually, of course, only a small portion of the area so burned is productive forest lands. Further, most of the fires which burn over most of this vast area are not forest fires, but grass fires set deliberately by farmers and stock men to improve forage upon lands which they do not own, but upon which they wish to range their stock free of charge. This is a serious problem. But it is not a reflection upon private forest owners so much as a manifestation of the age-old land-use struggle between grazing and forestry.

"Forest industries support six million people each year and woodlots help support two and a half million farms. Yet more than 380 million acres, privately-owned, are still without forest management." These statements do not harmonize, for the reason that the last one is not correct. The Chief Forester may not approve of the way these lands are managed; but they are under management, and most of them are contributing taxes and providing employment.

"Private ownership holds the key to our forest situation. With minor exceptions forest exploitation continues." It is the same sort of *exploitation* that continues upon the National Forests where timber sales are being made, namely harvesting

trees for manufacture into useful products. The fundamental difference which the Forester has in mind is that National Forests are being managed upon a basis of sustained yield—a comparatively simple matter for the government, while private forests are still predominantly managed for early liquidation of investments in mature timber, which are subject to heavy tax and carrying costs and are no longer paying their own way. But he almost fails to recognize the near-revolutionary change in owner attitude toward forest management which has occurred within the past decade, a change easily visible except to those who will not see. Sustained yield forestry is coming in the private field as rapidly as economic conditions permit. It is being preceded by adoption of more conservative logging practices, and closer attention to the necessity of protecting reforesting lands from fire. By giving virtually no recognition or encouragement to such efforts, the Chief Forester has ignored an opportunity to push ahead the private forestry which he so strongly urges.

Does the Chief Forester propose to destroy industries which support eight and one-half million people, in order to place them upon relief rolls or federal payrolls? A literal reading of his remarks about forest communities would suggest that the National Forests may eventually become the workshop of a large laboring population. Consumption of wood being limited by external factors beyond his control, it must follow that such communities will replace, and of course destroy, other communities now supported by similar enterprises engaged in harvesting privately-owned timber. His plan is not novel; it already is in successful operation in many lumbering communities.

It is not a fact that private forestry has failed, or that it can succeed only through federal regulation. Private forestry is on the march today. Informed private forest

owners are doubtful of the efficacy of federal efforts to regulate forest management upon private lands. Private ownership and industry would welcome federal efforts to do first things first, beginning with adequate cooperation in forest protection, research and diligent effort toward needed reforms in forest taxation. There is little in the record of either the Forest Service or the Congress to indicate that the federal government is equal to the task of solving our forest problem by outright regulatory legislation.

Although the Forester recommends vastly increased additions to the National Forests, he does not argue the case strongly. Presumably the Administration will scarcely approve further large expenditures for purposes which cannot produce immediately returns in employment. Extensions of federal acquisition are desirable. But in the development of plans for such a federal program, the voice of state and private as well as federal agencies should be heard.

The Chief Forester's report describes in a business-like manner the worthwhile achievements of his organization in managing the National Forests and in conducting educational work and research. As a pattern for federal legislation to solve our national forestry, it presents neither an accurate picture nor a sound solution.

JOHN B. WOODS,

*National Lumber Manufacturers
Association.*



CHAMBER OF COMMERCE OF THE UNITED STATES FAVORS FLOOD CONTROL ACT OF 1936

The ballot was taken on the report of a special Chamber committee advocating the policy of using established federal agencies for planning, coordinating and executing projects for developing the country's natural resources.

The specific recommendations carried

on the ballot, with the vote upon each, read as follows:

The Flood Control Act of 1936 should be continued and the projects thereunder prosecuted with vigor through the Army Engineers.

In Support—1723

Against—69

The federal government should continue to utilize directly its regularly established agencies operating on a national basis to plan, coordinate, and execute activities belonging to the federal government in relation to natural resources, including water resources, their utilization, and their control.

In Support—1662

Against—109

The federal government should in activities belonging to it in relation to natural resources proceed in cooperation with the states and preserve to the states all rights belonging to them in their resources.

In Support—1758

Against—37

Besides the text of the committee report, the referendum pamphlet carried arguments in the negative, in order that members might have the fullest information upon which to base their judgment in voting.

As evidence that the legislation is unnecessary, the committee pointed out that the conservation and development of the nation's natural resources are now being carried on by extensive federal and state agencies and that there is no present indication of any widespread neglect of national progress.

Furthermore, the committee declared that the setting up of seven new super-agencies would inevitably lead to conflicts and many duplications.

The committee suggested that, if a lack of coordination were to be found among existing agencies, remedies should be sought in reorganization legislation, not in superimposing a new layer of government upon the present structure.

The committee report declared the proposed regional method of planning and

administering projects and activities would be cumbersome, expensive and ineffective and would be more destructive than constructive as a conservation policy.

Definite findings of the committee were set forth as follows:

The bills would delay and impair the execution of needed flood control works.

The bills would authorize plans, which, if executed, would abridge functions of numerous departments and agencies of the federal government.

The bills would authorize plans, which, if executed, would abridge functions of the departments and agencies of the states, either by limiting the functions or by rendering their exercises to some extent unnecessary.

The bills would fail to promote the coordination of research and planning of natural resources development by existing federal agencies.

The bills would authorize the abridgment of the licensing policy of the Federal Power Act as regards water power development.

The committee voiced its concern over the placing of flood control under regional agencies, as the legislation proposes, because the War Department, which has been in charge of that work for many years, is thoroughly familiar with all phases of flood control.

"All questions of policy regarding the sharing of cost, local responsibility, residual state-rights in water resources with which the War Department has been dealing for many years, and concerning which it has maintained consistent policies," the report said, "would be placed in an uncertain status by a change to the proposed new and radically different regional policy."

The change, the committee added, would lead to further postponement of the exe-

cution of flood control works.

The committee emphasized the belief that the national aspects of conservation should predominate over regional aspects, and that this can best be attained by using the functional type of federal agency that now obtains, rather than through the proposed regional federal agencies.

Similarly, the committee pointed out, state cooperation and state representation can best be maintained under a dual system of federal and state governments, rather than through the intervention of superimposed regional governments federally controlled.



FOREST PLANNING—THE ROLE OF ECONOMICS¹

Josephson² has pointed out the complexity of the forest planning problem, maintaining that research in forest economics can assist in solving this problem "by analyzing the economic trends upon which planning is based, and by showing the combination of uses which will realize the highest monetary and social returns from the use of forest resources."

Foster³ takes exception to Josephson's article, particularly because Josephson thinks it possible that timber production as a primary goal of management should be restricted to the best sites, with areas determined by probable markets. According to Foster, we should manage all available forest lands for sustained yield timber production. "Long range prophesy," he says, "is a pleasant occupation," and proceeds to exemplify this observation by prophesying a limitless future need for timber products.

The broad generalities upon which Foster bases this prophesy require but pass-

¹Editor's Note: Attention is called to letters from E. A. Foster to R. C. Hall and from R. C. Hall to E. A. Foster. This issue, pages 359-360.

²Josephson, H. R., Economic research and forest planning. *Jour. For.* 35: 744-746. 1937.

³Foster, Ellery, Forest planning: How far can we go? *Jour. For.* 35:1066-1067. 1937.

ing comment. "Starved consumption" (a symptom, not the cause of the depression phase of the business cycle, is obviously an inadequate explanation of the decline in use of lumber cited by Josephson, and one which is inconsistent with the contemporaneous increase in use of substitutes. Since Foster is willing to rely upon the probable continuation of an upward trend in producing power, he is hardly in a position to criticize Josephson for giving weight to a downward trend in lumber consumption. However, even if all of the generalities cited by Foster are true, they take no account of the differential costs of growing timber on various sites and of its transportation to consuming points, and they afford no way of judging the quantity and location of standing timber for which an effective demand may be expected.

Josephson recognizes that land-use planning should take account of social objectives as well as financial returns. But, if the only choice were between the two extremes, production for profit alone would involve less social waste than the blind use of labor and savings that Foster proposes. Surely one must be far removed from any feeling for the rigors of man's struggle to wrest a better living from Nature and from any understanding of the logical implications of that struggle to ask for the investment of human effort except where a commensurate fulfillment of human needs can be definitely foreseen.

Most astonishing of all, coming from a forester, is Foster's doctrine that it is reprehensible to expect a return from growing timber, although entirely proper to demand payment for converting timber into usable products. Even a layman would hardly think it possible to grow timber without cost and solely "on the bounty of Nature."

Economics in forest planning, as seen by Foster, should be limited to determination of timber cut, provision for sup-

plemental employment of under-employed farmers, and prediction of short-term changes affecting forest industries. It appears to him that, "a little general economic and scientific knowledge is about all that can be used with reasonable certainty in planning how many acres to use for timber growing." In other words, the forest survey and other economic research in aid of forest planning are practically a total loss. However preposterous a "planned scarcity of stumpage," it seems sweetly reasonable beside this planned scarcity of knowledge.

In the writer's opinion, there is more to baking the cake than to cutting it up. In spite of unprecedented efficiency in production (achieved in what Foster terms "an age of economic barbarism"), there is a limit to human effort and capacity to sacrifice in order to provide for future requirements. It is the part of prudence to direct that effort and sacrifice to the end that it will bring the greatest future benefits. Among these benefits, watershed protection, recreation and the like, are not to be neglected. The cost of maintaining a forest cover adequate for such purposes is relatively small, however, compared with the cost of intensive silviculture, which in the main can be justified only by prospective needs for timber. How *many* acres is not so important as *which* acres and *how much investment* in cultural measures. It is the role of economic research to assist in answering these questions.

R. C. HALL,
U. S. Forest Service.



LEST WE FORGET

The tragic cost of the Blackwater Fire on the Shoshone National Forest in Wyoming last August 21 will be kept fresh in the minds of Shoshone visitors, by appropriate memorial action on the part of Region Two officials.

Recommendation has been made by the U. S. Forest Service to the U. S. Geographic Board that Double Mountain, a prominent feature of the Blackwater drainage, be renamed Clayton Mountain in honor of Ranger Alfred G. Clayton, one of the 15 men who died in the fire.

Winter quarters of the Tensleep Ranger District of the Bighorn National Forest, located in the town of Tensleep, will be named in honor of Ranger James T. Saban. The summer station of that ranger district, located near Tensleep Lake, will be named Tyrrell Ranger Station in honor of Junior Forester Paul E. Tyrrell. The Blackwater campground at the junction of Blackwater Creek and the north fork of the Shoshone River, in the Shoshone forest, has been designated Rex Hale Campground in honor of the Junior Assistant Technician who was in charge of a crew developing the campground when the fire call came.

Clayton, Saban, Tyrrell, and Hale were among the 15 men who lost their lives on the Blackwater forest fire. Suitable markers are planned for the memorial locations.



THE STANDARD ERROR OF ESTIMATE OF TREE VOLUME FROM THE LOGARITHMIC VOLUME EQUATION

Schumacher and Hall¹ express tree volume in terms of d.b.h. and height in the form

$$\log V = a \log D + b \log H + k$$

in which V , D and H are volume, d.b.h. and height respectively, and a , b , and k are constants determined from the data by the method of least squares. They obtain the standard error of estimate of the logarithm of tree volume from the usual formula

$$s^2 = \frac{N s_1^2 (1 - R^2)}{N - 3}$$

in which s_1 is the standard deviation of $\log V$, N is the number of trees used, and R is the multiple correlation coefficient.

The purpose of the present note is to show how the absolute, and the percentage, standard error of the estimate of volume itself may be easily calculated in such a way as to render entirely unnecessary the lengthy process of listing separately the individual discrepancies of either

$$(V \text{ observed} - V \text{ calculated})$$

in order to arrive at the standard error in volume units, or of

$$\frac{(V \text{ observed} - V \text{ calculated})}{V \text{ calculated}}$$

which leads to the percentage standard error.

One solution is the following²: Let $\log V = x$

then

$$V = 10^x$$

In general, if we know the standard error, σ , of a magnitude x , the standard error, σ_f of any linear function of x is given by the formula, well known in the calculus of errors

$$\sigma_f = \frac{dF(x)}{dx} \cdot \sigma$$

Carrying this notation to the logarithmic volume equation we have

$$\sigma = s; f(x) = 10^x; \frac{df(x)}{dx} = 10^x \log_e 10$$

Therefore the standard error of estimate of tree volume in absolute units, denoted by s_v , may be written

$$s_v = 10^x \log_e 10 \cdot s = 2.3026 \cdot 10^x \cdot s$$

¹Schumacher, F. X., and F. Dos S. Hall. Logarithmic expression of timber-tree volume. Jour. Agri. Research 47:719-734. 1933.

²See also Bruce, D., and F. X. Schumacher. Forest mensuration. McGraw-Hill Book Co. 1935 Sec. 139.

Finally, the percentage standard error of estimate of volume, denoted by $s_v(\%)$

$$s_v(\%) = \left(\frac{2.3026 \cdot 10^x \cdot s}{10^x} \right) 100 = 230.26(s)$$

The percentage standard error of volume is, consequently the standard error of estimate of the logarithm of tree volume multiplied by the factor 230.26.

Another solution is as follows: If we write

$$\log V = x$$

where $\log V$ is calculated from the logarithmic volume equation; and if we write

$$\log(V + \epsilon_v) = x + \epsilon$$

for the logarithm of the corresponding actual volume, then

$$V = 10^x$$

and

$$V + \epsilon_v = 10^{x+\epsilon}$$

so that

$$\epsilon_v = 10^{x+\epsilon} - 10^x = 10^x(10^\epsilon - 1)$$

which is the residual in tree volume in absolute units. In order to obtain $\epsilon_v(\%)$, the percentage error of volume, we divide ϵ_v by the volume itself and multiply by 100, that is

$$\epsilon_v(\%) = 100(10^\epsilon - 1)$$

Denoting the standard deviation of the logarithmic residuals, ϵ , by s , as before, the percentage standard error of volume

$$s_v(\%) = 100(10^s - 1).$$

Expanding 10^s by Taylor's series and retaining the first two terms only, this formula may be easily transformed into the first expression for $s_v(\%)$; for upon substituting 10^s for $f(x)$ in the equation

$$f(x) = f(o) + \frac{x}{1!} f'(o)$$

we obtain

$$10^s = 10^0 + \frac{s}{1!} 10^0 \log_e 10$$

and therefore

$$s_v(\%) = 100(1 + s \cdot 2.3026 - 1) = 230.26(s)$$

If s is not too large, say less than 0.10, the percentage standard error of estimate calculated by the formula $230.26(s)$ may be interpreted as usual, when it is taken for granted that the errors are normally distributed. In case s is greater than about 0.10, $s_v(\%)$ may be calculated by formula $100(10^s - 1)$, taking s with its positive and negative sign. Then the following statement is correct, when assuming that the errors ϵ are normally distributed: The probability that the percentage error in volume will be within the limits $100(10^s - 1)$ and $100(10^{-s} - 1)$ is 0.6826...

In order to test by a practical example the foregoing deductions, I obtained from the data of 112 trees of *Pinus hartwegii*, which served to establish a volume table (giving the volume of the entire stem, in cubic meters, the following results:

$$s, \text{ applying the formula } \frac{N s_1^2 (1 - R^2)}{N - 3} = 0.0569$$

$$s, \text{ computing } \Sigma (\log V \text{ calculated} - \log V \text{ observed})^2 / N - 3 = 0.0570$$

$$s_v(\%), \text{ applying the formula } 230.26(s) = 13.10\%$$

$$s_v(\%), \text{ computing } \Sigma$$

$$\left(\frac{V \text{ observed} - V \text{ calculated}}{V \text{ observed}} \cdot 100 \right)^2 / N - 3 = 13.24\%$$

The chi-square test was applied to determine if the actual distribution of the errors ϵ as well as of the percentage errors $\epsilon_v(\%)$ are significantly different from normal. By grouping the errors in classes of width 0.02 in the first case, and of width of 4 per cent in the second case, there were obtained 16 and 18 classes respectively. Entering the table of chi-square with 15 and 17 degrees of

freedom, it was found that there corresponds a probability of 0.94 to the value of chi-square for the distribution of ϵ , and a probability of 0.84 to the value of chi-square for the distribution of $\epsilon_v(\%)$. Neither of the two distributions is thus significantly different from normal, although the lower value of P in the second case confirms the statement that the distribution of the percentage errors in volume will not be exactly normal, if the errors ϵ are supposed to be normally distributed.

By H. ARTHUR MEYER,

*Instituto de Enseñanza e Investigaciones
Forestales y de Caza y Pesca, Coyoacán,
D.F. México.*



W.P.A. CREWS FIND COPPER SULPHATE EFFECTIVE AGAINST DUTCH ELM DISEASE

Many of the risks to which workers ordinarily are exposed in the fight against the Dutch elm disease have been eliminated on a New Jersey project of the Works Progress Administration. Copper sulphate, the relatively inexpensive blue vitriol of commerce, has largely replaced gymnastics among the 2,824 W.P.A. laborers aiding the Department of Agriculture in killing infected trees. The results are effective and the safety of the workers is assured, according to a report received at Washington, D. C., headquarters of the W.P.A.

Heretofore, each of the men assigned as scouts and field workers has had to be a cross between a steeple-jack and a fireman. Less than one out of three applicants for the jobs were able to qualify, for it is not every man between the ages of 18 and 35 who feels at home in the top of a 100-foot tree, or when swinging from one tree to another, high above the ground.

Such gymnastics were necessary when infected trees were to be cut down, since wide-spreading limbs must be lopped off before the trunk itself is chopped through. Now, however, three years of experimentation by Bureau of Entomology technicians have ended in a new and safer method of killing the tree, and with it the fungus which, carried by the elm bark beetle, has threatened to destroy every elm in the northern portion of the state.

Eighty per cent of infected trees are found in wooded rural areas. It is in the destruction of these trees that the new process has proven especially valuable. In cities and towns, as well as along main highways, infected elms are still chopped down and burned.

Where the chemical is used, the W.P.A. workers cut the bark and lay a narrow strip back against the trunk. Into the relatively small area of sapwood thus exposed, copper sulphate is packed, after which the bark is swung back in place, and a patch of oilcloth applied. The chemical kills the tree, usually in five or six days, and with it the fungus and its carriers.

The fungus which causes the disease is peculiar to elms, and may be said to "starve" the tree it attacks. Reaching sapwood from the burrows which carrier beetles have cut in the tree, the fungus forms gums and resins which clog the channels through which moisture reaches the leaves and branches, and the tree, thus deprived of nourishment, dies.

According to the report from William H. J. Ely, State W.P.A. administrator, \$438,474 of the \$1,095,000 in W.P.A. funds allocated to the Department of Agriculture in New Jersey for this work has been expended thus far.

Altogether, 2,824 W.P.A. workmen in New Jersey have been assigned to the war on Dutch elm disease.

NOTE ON "LOG GRADES AND LUMBER GRADES"

There has recently appeared (June 1937) a preliminary report (lithoprint) on Project 18 under the Bankhead-Jones Act entitled "Log Grades and Lumber Grades" which is based on a study made in the fall of 1936 and in June 1937 on the operations of the Cotton and Hanlon Lumber Company, Odessa, Schuyler County, N. Y., under the direct supervision of Prof. A. B. Recknagel of Cornell University, Department of Forestry.

The present report presents only the basic data derived from the study without an accompanying text containing conclusions, which latter will appear later when the results of similar studies now being made by the U. S. Forest Products Laboratory in New England become available.

The study included fifteen hardwoods and two softwoods, eastern white pine and hemlock. The report is of great interest and value because it presents the only data available for that region concerning the general range of log sizes secured from the various species, the percentage of butt and top logs, the amount of sweep, the number of knots in butt and top logs, the diameter and position of grub holes and rot, the relation between log scale volumes (Doyle and International) and lumber tally and the average percentage of lumber grades produced from each species. Five graphs are used to further elucidate some of the tables.

This data is essential not only to the forest manager who is concerned with harvesting the timber from a given tract of forest but also to those who are engaged in appraising the value of a given forest property. It is becoming increasingly important that foresters familiarize themselves with lumber grading technique and with the yield by grades for the various species in order that they may

evaluate the worth of timber which is grown under forest production methods, and also that they may properly appraise the economic value of various silvicultural procedures such as thinnings, pruning and like measures.

A knowledge of grades which may be produced from a given species is one of the keys to the correct solution of the marketing problem. There is a rather wide variation in the quality of lumber demanded by the various wood-using industries and a knowledge of what qualities of lumber will be available from a tract which it is proposed to cut will enable the producer to develop a market, in advance, for the quality of product his forest will produce and then to cut his product on an "order" rather than a "stock" basis.

It is to be hoped that further studies of this character may be made in the Northeast in order that we may have a more clear idea about the raw material with which we have to work.

This report is available in limited numbers, without cost, upon application to Prof. J. A. Cope, Department of Forestry, Cornell University, Ithaca, N. Y.

R. C. BRYANT,
Yale Forest School.



FORESTRY IN NIGERIA

The following is a synopsis of a letter received under date of October 2 by Professor Hosmer of Cornell University from T. W. Summers, Assistant Conservator of Forests in Nigeria.

Mr. Summers states that he is attached to the Working Plans and Research Office where his primary duty is to locate the most economic cutting areas and see that the creepers, which beset the valuable trees, are eliminated for an acre around each tree. To do this it is necessary to clear lanes about 5 chains apart and to map the valuable individual trees.

The working plans have provisions for compartments 1 square mile in area and bounded by clear cut lines 6 feet wide.

Contrary to general conception this part of Nigeria (Sapoba) is very level and no stones or rocks exist.

The three types of forest recognized are: (1) rain forest; (2) swamp forest and (3) mangrove forest. These, says Mr. Summers, are easily recognized and he has devised certain sub-types mostly based on whether the forest has or has not creepers dominant.

An interesting sidelight is thrown by Mr. Summers on the nature of forests in Nigeria in his statement that creeper cutting was found to be expensive when only one acre was cut around the large trees. Therefore they tried cutting two chains wide parallel to the boundaries and 5 chains apart. This was found to be more economical and easier to control the amount of work per day. To cut over an entire square mile 640 acres was found to cost \$275. Only 4 compartments have received this complete treatment.

In the last part of his letter Mr. Summers describes the work of sample plots which closely resembles that done in North America and Europe except that the trees have buttresses and require their diameters measured at 15 feet above the ground. The field party consists of 2 foresters and 2 laborers for cutting creepers and 2 more for carrying ladders.

Mr. Summers states that he has been practically alone, except for the native Africans, for six months, but did not feel lonely because he had much work of an interesting character. The nearest white neighbor is four miles away. He also is in touch with logging interests seven miles away that use the most modern type of tractor equipment.

Mr. Summers will be glad to hear from American foresters with whom he became well acquainted during his visit to the United States a few years ago. He may

be addressed at Sapoba via Benin City, Nigeria.

A. B. RECKNAGEL,
Cornell University.



THE INTERNATIONAL CONGRESS ON TIMBER UTILIZATION AT PARIS

The Third International Congress on Timber Utilization was held under the auspices of the Comité International du Bois on July 26-28 inclusive in the Pavillon de Bois, at the International Exposition. This congress brought together ninety-eight delegates, besides the French representatives, from twenty-nine nations. Generally from 150 to 250 or more persons attended the various sessions. The *raison d'être* of these meetings was *How Wood May Better Serve Mankind*. In America, foresters naturally have heretofore felt that the problems of timber utilization were fairly well solved in Europe because of the high stumpage values and relatively attractive prices paid for wood products. And yet one finds that some countries such as France are not fully utilizing their annual wood growth. The delegates of most of these nations, whether exporting or importing, felt that the markets for wood products need protection, expansion, and development. In nearly all of the northern, central, and western European nations a Timber Development Association has been organized. These local associations are variously supported by a combination of governments owning timberlands, various national and state forest services, private foresters, individual lumber exporting and importing organizations, research specialists, and timber engineers.

In the United States, the principal effort to extend the markets for wood has been made by the National Lumber Manufacturers' Association. Many American foresters have felt that this was the respon-

ability of the timberland owner and lumber manufacturer rather than of the forester or others.

The French government stimulated by its forestry officials and at considerable expense constructed a huge building known as the Pavillon de Bois at the International Exposition to demonstrate the advantages of wood construction. The entire exterior and interior were built of wood. This building houses interesting exhibits tracing the development of a tree from the seed and reforestation stages through the various silvicultural processes to the harvesting of the product and to its final utilization. Thus lumber, paper, wood gas, and many other chemical products were displayed to excellent advantage. The convention was held in a large main hall beautifully and artistically finished. This also served as a great banquet hall and was the "locus" of a dinner given by the French government to the attending delegates. This was presided over by the Secretary of State for Agriculture and Forestry, M. Lyautey.

The three days' session which took up most of the time continuously from 9:30 A. M. to about 7:00 P. M. was devoted to a consideration of: (1) Timber preservation; (2) How timber markets can be expanded; (3) The use of charcoal and wood gas for the motivation of engines, principally automobiles, stationary, marine, and locomotive types; (4) Modern problems of timber conversion.

The only two American delegates present were Carlile P. Winslow, Director of the U. S. Forest Products Laboratory at Madison, and the writer. Mr. Winslow presided at the timber preservation session on the first day and was elected to serve as chairman of one of the permanent committees. Considerable interest was expressed by many delegates in American conditions and the two representatives of this country were frequently asked to answer questions concerning lumber and

cross tie production, timber preservation, research activities, American methods of timber conversion, and other conditions existing in this country.

Some of the outstanding features of the convention were as follows:

1. The high calibre of the representation. For instance, the Director General of Waters and Forests for France, Mr. R. Chaplain, and some of the professors of forestry at the National School of Forestry at Nancy, and the new national school of Forest Utilization at Paris (Ecole Supérieure du Bois) represented France. Dr. J. A. von Monroy and Major Brauer, head of timber propaganda in the new 4-year plan, represented Germany. Many of the leading foresters, lumbermen, importers, and research specialists of Italy, Austria, Switzerland, France, Germany, Poland, and of other nations were in attendance.

2. General agreement among those present that wood needs promotion and wider advertising not only among technical men, such as engineers, architects, etc., but among the general public, and notably among school children.

3. The work of the congress will be further expanded and developed to make its services more useful to a larger number of people. The services are already translated into three languages and summaries of recent research studies, and of international statistics of production, export, import, and other significant facts are made quickly available to those interested. Improved methods of marketing and new outlets for wood are quickly reported and made available to the contributing nations or organizations.

4. This work is supported not only by governments that have investments or interests in timberlands, but by various lumber associations, such as exporters, importers, manufacturers, and distributors. It is also supported by private and corporate funds. Thus it is the common

effort of all organizations interested in the production, manufacture and sale of all forms of forest products.

5. Probably the most significant fact impressed upon the writer was that wood may prove to be the most important single basic raw material of the future, because of its almost universal potentialities. Dr. von Monroy made the statement that wood may prove to be more important to Germany than iron, coal, oil, rubber, textiles, or any other basic material. Many European countries are exceedingly deficient in these basic materials. Consequently, there is a constant struggle to make them self-sufficient and independent of foreign sources of supply. Thus wood is being used not only for construction and building purposes and for ordinary uses such as cross ties, poles, posts, piling, etc., but in laminated and compressed form for many articles formerly made of iron or other metals. It is also used for textiles (rayon and wood wool), animal food, and in the production of many chemicals, etc.

Wood is supplanting gasoline as a source of power in various types of engines, principally in automobiles. More than 15,000 automobiles in France, Germany, Italy, Austria, and Switzerland now use wood gas. Improved methods of burning in wood stoves are being developed, particularly a method of using compressed sawdust in the form of cartridges to give a more durable and economical fuel.

6. A very notable feature of the congress was the very facile and accurate translation of all the papers and discussions in two other languages. Papers and discussions were delivered in French, English, and German, and immediately upon completion of any statement, Dr. E. Glesinger translated it into the other two languages without reference to notes and in a very pleasant and efficient manner that was most impressive.

The congress was conducted by the

Department of Timber Utilization, which is autonomous and under the immediate presidency of Mr. R. Chaplain, Director of the National Forest Service of France, and secretaryship of Dr. E. Glesinger. There are two other branches in the *Comite International du Bois*. These have their headquarters at Vienna, because of the excellent translation services available, the low cost of printing and mailing services, and the fact that specialists working for little or no remuneration are available there.

One of these two branches is the main *Comite International du Bois*, composed largely of five exporting nations—Poland, Czechoslovakia, Austria, Rumania, and Jugoslavia, the president of which is Count Krystyn Ostrowski of Poland. Two importing countries—France and Italy—also support this work. The other is the *European Timber Exporters' Convention*, which attempts to fix export quotas for softwoods and is composed principally of Russia, Finland, and Sweden. Dr. E. Glesinger is secretary of all three branches.

The principal activities of the Department for Timber Utilization in which many of the foresters are interested are:

1. It serves as a clearing agency between technical, research, and promotional activities of the various timber development associations in each of the 15 or more importing and exporting countries supporting the activities of the Department.

2. The publication of the *International Timber Review* containing recent statistics and up to date information.

3. Organizing and managing the annual conferences.

4. Answering many inquiries about timber developments in various countries.

5. Miscellaneous activities including the exchange of publications, translation service, compilation of special statistics, and various other services.

The United States should be vitally interested in these conferences and the work

being conducted because this nation was the pioneer in timber promotional work beginning in 1912 to 1914, and actively developed prior to the economic depression by the National Lumber Manufacturers' Association. Inasmuch as the United States is the most important lumber producing nation (and at one time was the most important lumber exporting nation), and inasmuch as it has vast timber resources now being converted into lumber and other products, foresters, lumbermen, and others should be interested in joining and in actively supporting the work of the *Comite International du Bois*.

In Europe, Germany was the first to start timber promotional work in 1929-30. Then Switzerland entered the field; then Great Britain in 1934, and since then France, Belgium, Holland, Austria, Italy, Czechoslovakia, Poland, Rumania, Sweden, Finland, India, Canada, Australia, and other countries have become actively interested.

It is quite apparent that if the C.I.B. had not been in existence, those interested in the growing, manufacture, and use of timber products would have lost many markets to other materials. Mr. Latham of England cited the fact that there is a constant struggle in Great Britain between the timber and steel interests for markets resulting from the construction of railway cars and from shipbuilding, for which large sums of money are available. If this "battle for wood" is effective, it should materially assist the export trade for American lumber as Europe has been an important market for our product.

In Germany about 200,000 marks are annually made available for the Government Office of Timber Propaganda in Berlin. This is in sharp contrast to conditions in this country where the government spends practically no money for propaganda in behalf of wood, and yet the government is one of the largest single owners of timberland in the country.

It is very apparent that foresters in

Europe have taken the leadership in this work. Among them are Dr. J. von Monroy, head of the 4-year forestry plan in Germany, Major Fritz Brauer, Dr. Edgar Morath, and others in Germany; the Director General of Forests and Water, M. Chaplain, Professor Guinier, Head of the National French Forestry School, Professor Fortunet, Head of the new School of Forest Utilization at Paris, and other French foresters for France; Professor Ottario Scrittore in Italy; Dr. H. G. Winkelmann in Switzerland; Professor M. Y. Tsuji of the Imperial Research Institute of Tokio; Dr. Dramba of the Rumanian Forestry School at Bucharest; Professor F. Hagglund of Stockholm; and many others.

In Europe the lumberman is often the forester and the forester often the lumberman; both have similar objectives. There is no conflict of ideas as so frequently is the case in this country. It is believed that we in America can well take a "leaf out of the book" of European practice by bringing about a closer liaison between the forester and the lumberman to attain the same happy results. It is believed that the United States should be actively represented at the future meetings of the C.I.B. and that financial support should be forthcoming from this country through properly delegated agencies to assist in the consummation of the excellent objectives indicated above.

Wood needs protection, defense and expansion. If foresters are only concerned with growing the crop and the market for this crop is permitted to become restricted or vanish completely there will be little excuse for our profession. On the other hand, many new articles are being and may be made from wood. It is possible that we foresters may need a new and broader vision of the objectives of our profession. It is perfectly conceivable that wood may prove to be the most important single basic raw material of this country as it appears to be for

some of those in Europe. If our metal, oil, and other resources which have made this country so rich become depleted, we may have to turn to wood as a principal source of not only our construction, container and writing materials but for clothing, chemicals, gasoline, and other supplies. While this may appear at present to be only an "idle dream", yet who would predict a few years ago the quick rush of the paper and pulp industry to the South, the enormous increase in the production and use of fiber boards, rayon, cellophane and plastics, the adoption and increasing use of timber connectors, or the great demand for and increased use of plywood and other forms of veneer products?

NELSON C. BROWN,
N. Y. State College of Forestry.



REVEGETATION OF SMALL GULLIES THROUGH THE USE OF SEEDED EARTH-FILLED SACKS

Grasses are the most effective herbaceous plants in protecting the ground surface from soil-erosion forces. This is plainly evident where, on other than forested areas, soil erosion has been kept under control for centuries by protective vegetation, and particularly is this fact evident where gullying and sheet erosion have been brought under control through natural vegetation. Thus, any measures that can be taken to hasten revegetation of grasses, particularly on deteriorated and eroded range lands, offer distinct advantages.

A method of revegetation with grass has been tried at Parker Creek Forest and Range Influences Station, a branch of the Southwestern Forest and Range Experiment Station, located 45 miles north of Globe, Ariz. This method, which may be found useful in controlling small-gully erosion, consists in the use of gunny sacks

filled with earth in which grass seeds have been mixed. Discarded gunny sacks which had no large holes in them were used. The sacks were first filled with good top-soil material, and then grass seeds were mixed in the soil material next to one side of each sack. When set in place across gullies, each soil-filled sack was laid with its seeded side up. (Figure 1.) The ground surface was loosened slightly with a spade before the sacks were laid in place, and the soil was tamped in front and around the edges on the uphill side forming a small check dam across the gully. The middle sack, which occupies the lowest point in the gully, serves as a spillway, and the two sacks on the sides prevent the water from side-cutting. When a gully is very small, a single sack partly buried across the channel serves to prevent further cutting.

Seeds of grasses native to the region around Parker Creek were used. Two of these grasses, side-oats grama (*Bouteloua curtipendula*) and hairy grama (*B. hirsuta*), are probably the most important forage grasses in the chaparral and woodland areas of Arizona. Sprangletop (*Lep-
tochloa dubia*), another important range grass, and Bermuda grass (*Cynodon dactylon*) were also used.

Grass seedlings made their appearance on the placed sacks soon after the summer rains began, and grew to a height of several inches during the first growing season. By the end of the second summer, the grasses were well established, and the sacking began to disintegrate.

The earth-filled sacks aided revegetation in two ways: First, they increased the supply of soil water available for plant growth above the dams by retarding and impounding surface run-off. Secondly, they served as a protected and prepared seedbed in which the grass seedlings easily established themselves. The sacks absorbed the rain water readily, and they did not dry out so quickly as did barren, eroded ground areas. Annual weeds,

which grew profusely above and below the sack check dams, indicated how ideal the conditions formed were for growth. The sacks enabled the seedlings to survive the hot dry periods which ordinarily are fatal to young seedlings on barren eroded soils. During the same testing period, there was but little success with direct seeding on bare ground.

The method described is peculiarly suitable for use in the revegetation of small gullies where erosion control is likely to be most effective; for gullies, like forest fires, can be controlled best when they are small. If gullies can be controlled before they become large ones, much expense can be saved, as when large structures must be built. Checking surface erosion at the source of accelerated run-off, where small gullies begin, may be the saving of valuable topsoils from which grasses obtain their main subsistence, and thus prevent their being carried away to play the role as damaging silt and filler-up of storage reservoirs.

Permanent control of gullies on range lands can be effected only through revegetation of the slopes from which accelerated run-off originates. While revegetation is in progress, reclamation of small gullies can be speeded up by artificial means.

Where gullied areas are small and the closing of such areas to grazing is not practicable, seedlings established through the use of earth-filled sacks may be protected by brush limbs. The brush not only affords protection from grazing animals but also aids in conserving soil moisture by retarding evaporation. In the use of this sack method and other methods of erosion control and revegetation, the need for proper control of grazing to prevent further deterioration of existing vegetation and to assist natural revegetation should not be overlooked.

B. A. HENDRICKS,

*Southwestern Forest and Range
Experiment Station.*



Fig. 1.—Soil-filled sacks with seeded sides up, laid across small gullies



REVIEWS



Textbook of Dendrology. By William M. Harlow and Ellwood S. Harrar. 527 pp. *Illus. McGraw-Hill Book Co., Inc., N. Y. and London. 1937. Price \$4.50 (bound in cloth).*

The old Athenian entourage of Supreme Court Justice Dionysius, Mme. Damaris, and others would have been intrigued by this fine book, judging by Acts 17: 21; it is certainly a "new thing." Foreign dendrological textbooks are fairly common, e.g., Hickel's in France, Klika's in Czechoslovakia, and Kudriani's in Russia. But whoever before heard of an American textbook of dendrology? It is true that Prof. Burton O. Longyear, of Colorado Agricultural College, got out a 237-page "Dendrology Text" in 1934, but it was mimeographed only and without illustrations. Again, in 1935, Dr. Harrar, the junior author, published at Seattle a 175-page "Forest Dendrology," but only "Part I. The Hardwoods" appeared therein. However, that book obviously served, in part, as a basis for this present work.

This new text is dedicated by the authors to Prof. Harry Philip Brown, "whose zeal we admire and whose friendship we prize." The volume consists of a brief preface; a full statement of acknowledgments; an elaborate 38-page introduction; the main body of notes (451 pages); a 3-page glossary; an 11-page selected bibliography of 256 titles (actually about 300 titles are covered owing to lumping under "Anonymous" and elsewhere), and a 21-page index. The admirable introduction discusses the nomenclature of both English and Latin names, annotates the history and philosophy of scientific classification, provides an illustrated glossary of leaf terminology, gives much illustrated material on the morphology of flowers, fruit, and twigs; and generally

annotates the subjects of bark, range and distribution.

The authors define dendrology as including the taxonomy of woody plants—including trees, shrubs, and (woody) vines; tree habits, and tree ranges. This definition emphasizes the very wide divergence of opinion among authorities as to what dendrology really is. For example, contrast with this definition the definitions of Sudworth (p. 15 of his *Forest Trees of the Pacific Slope*), of H. de Forest in his *The Scope of Dendrology in Forest Botany* (*Forestry Quarterly* 12(2): 228-234. 1914) and the comments appended thereon (pp. 234-7, *op. cit.*) by Dr. Fernow and C. D. Howe. The Committee on Forest Terminology of the Society of American Foresters in its formal report (*Jour. For.* 15(1): 68-101. 1917) omits dendrology from its glossary. It is earnestly recommended that the Society consider this matter in connection with any additional efforts made by it in the direction of term standardization.

"Candid camera fans" will be pleased with the profuse and, in the main, excellent illustrations. These are chiefly half-tones, most of which are made from original photographs taken with a modern miniature camera. With most of the main write-ups, trunk, bark, leafy spray, fruit and flower details are shown. The senior author's notable contributions to the microscopic leaf morphology of pine leaves are reflected in the illustrations for that genus. A valuable feature is the interpolation of numerous tree seedling pictures. Rather than to use detailed keys, the authors prefer, for their purpose, diagnostic distinctions of families and genera arranged in tabular form.

It is not surprising that 192 pages, or over a third of the book, are devoted to

Gymnosperms. The authors point out in the preface that "the native coniferous genera have all been included because of their relative importance, and fewer numbers." Aside from brief notes on cycads, ginkgo, and ephedras and other Gnetales, this Gymnosperms chapter is devoted to a discussion of 15 genera, 85 species and 2 varieties of conifers; 75 pages are devoted to discussing the pine genus and 36 of its species. The writers divide pines into soft pines and hard pines, and the soft pine group is subdivided into true white pines, stone pines, nut pines, and foxtail pines.

The Angiosperms chapter covers 259 pages, or practically half the entire book, and consists of main write-ups for 39 genera, 119 species and 5 varieties of hardwoods or broadleaves, supplemented by brief secondary notes on about 94 additional general and 109 additional species. Fifty-nine pages are devoted to discussing the genus *Quercus* and 34 species and 4 varieties of oaks. The authors indicate that "several families, and many genera and species of the broad-leaved trees have been omitted."

In general, the individual species notes consist of a brief opening paragraph labeled "Distinguishing Characteristics" in which the most salient field recognition characters appear to be emphasized; a full paragraph headed "General Description" giving notes on such general subjects as aspect, size, commercial importance and distribution, site characteristics and other silvical or ecological requirements; associates; economic history; life history; insect and plant enemies; reproduction, etc., etc. (this collection of basic data is, perhaps, the most valuable single feature of the book); a geographical distribution paragraph headed "Range"; and a final morphological tabulation headed "Botanical Features."

In a work such as this, which must necessarily be a syllabus of myriads of discrete facts and observations, the writers

would hardly be human if an occasional misstatement or error did not rear its head. The authors ask that these, when noted, be brought to their attention. They have themselves generously pointed out a sort of typographical mix-up in the monocotyledon-dicotyledon table on p. 232. Reference is made in the preface to "the thousand tree species native to this continent." Doubtless the authors intended to say "country," rather than continent. The statement (p. 231) that angiosperms "are the most conspicuous . . . plants" seems to need emendation or clarification. It is difficult, for example, to conceive of any vegetative type more "conspicuous" than a coniferous (say, a redwood) forest. The authors say on p. 232: "There are no important monocotyledonous timber trees in North America"; even with the qualifying footnote on cabbage palmetto, this seems just a little too strong. Perhaps the writers meant the United States, instead of "North America"? The tacit recognition (p. 235), as valid genera, of *Chosenia* Nakai and *Toisusu* Kimura, whereby two Oriental willows have recently been transferred by two Japanese botanists, seems to this writer ill-advised and premature.

The statement (p. 255) that *Juglans hindsii* and *J. californica* "are two unimportant California walnuts" surely needs editing. Not only is *J. hindsii* an important street and ornamental tree in California but it is the chief stock there for the English walnut, the cultivation of which is an important industry in that state. Perhaps a little greater care might have been shown in connection with parenthetical authorities; for example, in the 11 species of hickories discussed (pp. 265-278), the parenthesized, or basic, authority is omitted in all but one of the *Carya* synonyms listed. On p. 300, we read: "The name beech has a very ancient origin and presumably signifies book." The Century Dictionary, regarded by many competent persons as perhaps the most

scholarly and authoritative of our dictionaries so far as English plant name etymologies are concerned, derives beech through Middle English *beche* from Anglo-Saxon *bēce* and *boēce*, birch; whereas book is traced, through Middle English *booke* and *bok*, to Anglo-Saxon *bōc*, book. The dictionary adds: "The connection with *beech* remains uncertain." It would be safe to say that beech and book trace from somewhat similar Anglo-Saxon words and, by some, are regarded as cognate nouns. Would it not be a bit better (p. 397) to say that the rootbark, rather than "the roots" of sassafras is used in making sassafras tea? Everybody I personally know who enjoys sassafras tea uses only the rootbark, and it is only the rootbark which I see for sale in the local markets.

After all, however, these criticisms are of relatively trifling matters and, after mentioning them, the critic blushes to recall the old adage *aquila non capit muscas!* The fair-minded must needs be impressed with the wide reading, broad experience, and ripe scholarship which have obviously entered into the framing of this excellent book, with its timeliness and value, and with its giving to Americans, for the first time, a general tree textbook written by professional foresters from the forester's viewpoint, and with the main objective of helping to train foresters. This reviewer will be surprised if the book does not endure through many editions and revisions.

W. A. DAYTON,
U. S. Forest Service.



Foundations of Silviculture upon an Ecological Basis. By the late James W. Toumey, revised by Clarence F. Korstian. xix+456 pp. *Illus.* John Wiley & Sons, Inc., New York. (Chapman & Hall, Ltd., London.) 1937. Price \$4.50.

As this work deals largely with funda-

mentals which are not subject to change, it might appear that there was less need for revision of the original text than in the case of the same author's *Seeding and Planting*. However, the revision has been so thoroughly and thoughtfully done that it has added new worth and usefulness to this valuable treatment of the subject.

While the general plan remains the same, there has been a considerable rearrangement of chapters and sections and an extensive rewriting of many portions in order to bring about a more logical sequence of subjects and to introduce new material. The chapter on soil conditions has been most changed in order to bring it into line with present concepts, but is rather dissatisfying in its first sections, owing to its extreme brevity. Technical terms are used without definition and so are unintelligible to one lacking a previous knowledge of soils. To one with such a knowledge, much of the material given would be unnecessary. Some further expansion here would seem to have been worth while. Nevertheless, the chapter as a whole is a distinct improvement on the original version.

At the end of Part I, dealing with the environment of the forest, a chapter on the interaction of site factors has been added. In Part II, a section on the effect of forest vegetation upon stream flow has been introduced.

Part III begins with the tree, its structure, functions, and other important characteristics and then discusses the stand, forest vegetational units and their classification, and the origin and development of forest communities and forest succession, in that order. This order, which is just the reverse of that formerly used, seems more logical.

A new appendix lists the common and scientific names of trees.

A comprehensive bibliography of more than 30 pages follows the appendix, instead of being broken up in the form of footnotes, as in the first edition, and is

arranged alphabetically according to the names of the authors.

No forester's library should be considered complete without this book.

L. J. YOUNG,

University of Michigan.



Het Geslacht Populus in Verband met zijn Beteekenis voor de Houtteelt. (The Genus Populus and its Significance in Silviculture.) By G. Houtzagers. 266 pp. 62 halftone and 2 text figs., 1 map. H. Veenman & Zonin, Wageningen (Netherlands). 1937.

This recent study of the genus *Populus*, although of special importance in countries where the poplars play an important part in silvicultural practice, is also of great interest and value to American botany because it is the first thoroughgoing attempt to clear up the taxonomic and nomenclatorial confusion that has come to pervade both European and American treatments of the genus. The author points out that, as long as uncertainty prevails regarding the botanical status of the various forms, it is impossible to make "comparative study of their susceptibility to disease and injury, particularly to canker and *Dothichiza* or to insect attack; nor will it be possible to compare the extent to which they are exacting in their requirements, their best method of culture, their growth-factors, the value of their timbers, etc". He further maintains that only when a botanically correct classification has been drawn up so that one may be certain about one's material can further research be made successfully and without undue expenditure of time.

Among the poplar trees grown for timber in Europe today, hybrids predominate. Most of them have arisen spontaneously and have almost completely superseded both the American and the European parents. The ready hybridization between all sorts of poplars is the underlying cause

for most of the difficulties which beset the whole problem of the taxonomy and nomenclature of the group. As an example of the utter confusion that exists in the nomenclature the author gives a specific case as follows: "Those who read descriptions, for instance, of *Populus canadensis* in various botanical works, without having in mind the authority for the name and without knowing that *P. canadensis* Mönch, *P. canadensis* Mathieu, *P. canadensis* Michaux and *P. canadensis* Aschersohn are four different species or hybrids, will be staggered by the great differences in the features described." Another source of trouble has been the vagueness and incompleteness of the original descriptions which often mentioned or stressed only a single character and on account of which parent and hybrids have repeatedly been confounded. Furthermore, the trade has contributed materially to the confusion by continually putting into circulation new names for forms which have been recommended as superior to former hybrids. This practice has resulted in a host of local names in Holland as well as in Belgium, France, Germany, and England.

Dr. Houtzagers' treatment is divided into 12 chapters, the first of which deals primarily with culture and uses of poplar wood in Holland. The total number of trees is given as 1,940,452, the average rotation for the whole country is estimated at 25 years, the annual increment 80,000 cubic meters, the average felling circumference 1.40-1.60 m., the average timber length 12-14 m., and the average volume per tree 1 cubic meter. In the first-class poplar districts these figures would run considerably higher, the average volume, for instance, amounting to 1.5 m³.

The second chapter is devoted to the formal systematic treatment of the genus. Synopses are given of the five sections, *Turanga*, *Leuce*, *Aigeiras*, *Tacamanhaca*, and *Leucoides*, into which the genus is divided, and under each follow further subdivisions with descriptions and the synonymy of the various species and hybrids.

In chapters III to VIII, inclusive, are discussed in order matters of nomenclature, detail taxonomic features, periods of flowering and defoliation, and leaf characters, supplemented with numerous half-tone figures.

Chapter IV is particularly illuminating and of special interest to American silviculturists, for here he discusses the American representatives of the section *Aigeiros*. After reviewing the attempts of Sargent and Rehder to prove that Linnaeus, when describing *P. balsamifera*, meant *P. deltoides* (either *angulata* or *monilifera*) and not a balsam poplar, the author very appropriately remarks: "The new confusion thus created by Sargent and Rehder (C. Schneider has adopted this new conception too) ought to be abolished internationally as soon as possible. The more so, as the view of Sargent, Rehder, and Schneider in this respect is entirely mistaken. The leaves Linnaeus used in 1753 to describe *P. balsamifera* are still extant at the Linnaean Society, Burlington House, London. The writer examined them in 1935 (see reproduction on page 63) and was able to determine then that there is no doubt that Linnaeus did not mean an *Aigerios* poplar. His leaves are positively and clearly those of a representative of the group *Tacamahaca*. Sargent, Rehder or Schneider can never have seen them, or they could not have doubted further." Having shown beyond doubt that Linnaeus had before him a poplar of the section *Tacamahaca* and not an *Aigerios* when he described *P. balsamifera*, and perhaps influenced by a proposal made by Rehder in correspondence in 1932, the author suggests that the many-sided confusion concerning *P. balsamifera*, *tacamahaca*, *deltoides*, *monilifera*, *angulata*, *canadensis* could be disposed of for good by the adoption of the following names, which he declares "would make matters botanically more correct; viz.":

P. deltoides Marshall var. *monilifera* Henry instead of *P. monilifera* Aiton (On-

tario, Quebec, New England, and Pennsylvania).

P. deltoides Marshall var. *missouriensis* Henry instead of *P. angulata* Aiton (Mississippi "territory", Virginia, Carolina, Southern Atlantic, and Gulf states).

P. deltoides Marshall var. *occidentalis* Rydberg instead of *P. sargentii* Dade (Western North America east of the Rocky Mountains).

P. angulata Aiton (for the tree which shortly after its introduction into Europe apparently underwent a mutation, as it differs from the American form in its larger and more "shouldered" leaves and in the non-ciliate, coarsely dentate flower scales).

P. tacamahaca Miller instead of *P. balsamifera* Linnaeus and *P. balsamifera* Du Roi.

It is difficult to understand why the author should still recommend the use of the name *P. tacamahaca* after he has shown through the existence of the type that Linnaeus applied the name *P. balsamifera* to a balsam poplar and not to one of the black poplars. From the statement of "Habitat in America septentrionalis", which occurs in the original description in the Species Plantarum of 1753, there should be no doubt about which balsam poplar Linnaeus meant. Since the interpretations of Sargent and Rehder are now shown to have been wrong, the arguments for discarding the name of *P. balsamifera* on the ground of causing confusion should be effectively disposed of. It would seem, therefore, that the only name that our balsam poplar can properly bear, according to accepted rules, is the one that was originally applied to it and the one under which it passed for a century and a half without any misunderstanding.

The author supplies a very complete English summary of his studies, and this is further supplemented by an English translation of the entire contents of Chapter IX under the following headings:

1. General key for the determination of

the several groups, species, and hybrids of the genus *Populus* L.

2. Tabulated conspectus of the several principal characters of some most commonly known and planted poplars of the section *Aigerios* Duby (black poplars).

3. Botanical classification of the genus *Populus* L.

4. Geographical classification of the genus *Populus* L.

Those with little or no reading knowledge of the Dutch language will find the English summary and accompanying supplement a very welcome addition and they will further appreciate the innovation of the captions under all the halftone figures throughout the text being printed both in English and Dutch.

The author has rendered a great service to taxonomy as well as to silviculture by his critical and exhaustive studies of an inherently difficult and confusing group.

C. O. ROSENDAHL,

University of Minnesota.



Practical Tree Surgery. By Millard F. Blair. 276 pp. *Illus. The Christopher Publishing House, Boston. 1937. Price \$4, with special binding \$5.*

This recent book contains considerable material of interest to the forester and arborist. Its chief faults are that most of the subject matter on insects and disease attacking trees has been adequately covered previously in standard texts and government and experiment station bulletins, and that certain portions of the comparatively small part of the book devoted to "tree surgery" are somewhat sketchy and occasionally out of date.

The first 50 pages are devoted to brief descriptions of "representative types" of trees, shrubs, and vines (particularly West Coast species), with lists of some of the insects and diseases which attack them.

In the next 48 pages some of the principal wood-rot fungi, cankers, galls, gum-

mosis, rusts, blisters, mildews, moulds, blights, wilts, leaf spots, mistletoe, and mycorrhizas found on trees are discussed briefly. The recommendations should be followed with considerable judgment and restraint. For instance, the author makes the somewhat questionable statement that *Endothia parasitica* may be controlled by tracing and excision of the canker followed by a bichloride of mercury and glycerine treatment.

The important subject of physical and toxic injuries to trees is discussed in 4½ pages. Subjects mentioned are sun scorch, sunburn, winter drying, freezing of twigs, asphyxiation or drowning, gas injury, drip injury, and spray injury. The chapter would have been improved if the author had described and recommended treatment for such nonparasitic and environmental troubles as frost cracks and winter root injury; sleet and ice damage; chemical injuries caused by road oils, salts, and gases from manufacturing plants; mechanical injuries caused by wind-breakage and mechanical abrasions; damage resulting from cuts and fills around trees; electrical injuries caused by lightning, electrolysis, and power lines; and such injuries as slime flux, girdling roots, etc.

Insect enemies of trees and their control are discussed in the next 100 pages. The section would have been improved by data on spreaders and stickers, discussion of both effective and dangerous spray combinations, and more material on spraying technique and hazards.

The next 76 pages are devoted to principles and practices of "tree surgery", and include chapters on Tree Structure; Trimming Large Trees; Planting and Pruning Fruit Trees; Bracing Large Trees; Cavity Repair; Feeding Trees; Tree Moving; Rope, Knots, and Equipment; and Grafting and Budding. This section, from which the title of the book is taken, is rather disappointing in its scope. The chapters on "Tree Structure" and "Trimming" contain information of considerable value, but they are far from being complete. The

discussion of bracing is somewhat behind modern practice both as to technique and materials. For example, mention is made of the use of square-headed lag screws, cut off and bent by a blacksmith, and cable clamps are recommended instead of the eye splice. The need for protecting cable loops with thimbles and for locking loops in place is not mentioned; nor the availability of manufactured lag hooks, hook bolts, eye bolts, screw rod, eye nuts, and the more durable copper-covered and copper cable, etc.; and the proper combinations and strength of cable and anchoring devices.

Cavity treatment will doubtless continue to be a controversial subject in the future as it has been in the past. The author brings out the fact that the perfect cavity treatment has yet to be devised, and describes a "shell concrete" filling as the most practical to date. Many will doubtless take exception to this conclusion. In the light of the relative success of the magnesite composition filling, the treated wood-strip filling, and the new and promising rubber filling it would seem that the discussion on cavity filling is inadequate. Some discussion on determining where and when cavity treatment is justified would have increased the value of the text to the lay reader.

In the chapter on "Feeding Trees," the author fails to mention the basic reason for artificial fertilization, which is depletion of available soil nutrients. He mentions such fertilizing methods as replacement of soil, surface or broadcast fertilization, trenching, punch system, dynamiting, and water pressure. The main dissertation is on the trench system, a method which has been largely discontinued in the East for the past 15 years. The chapter would have been more useful if the author had gone into the value of various fertilizer ingredients, formulae and dosages, and described the liquid and aerofertil methods as well as a more modern punch-bar technique.

In the few pages on tree moving only one method is described—the box system, which has a limited application. With the many tree-moving devices, machines, and techniques that have been used successfully in recent years it would seem that the chapter should have included at least the outstanding modern systems.

The chapter on rope, knots, and equipment is interesting and will be of value to men working in trees. The reviewer seriously questions the author's comment on the safety sling in which he says, "It is not wise to always use this system, but at times it is of great aid." Most experienced organizations have a wise rule that a safety sling shall be in use at all times the climber is off the ground. No device has avoided more injuries than this one, and it is hard to visualize a circumstance where a safety sling is undesirable. Under the subheading "Equipment" the author mentions tapering a hand saw by cutting some of the metal from the back, and making pole saws by removing the grip from hand saws and fastening the baldes in slots sawed in long poles. Why not use similar manufactured articles which are available ready-made from many sources? This chapter fails to give information on the availability and desirability of the many electric and air-power tools now in general use.

The bibliography includes 25 references of value, but the conspicuous omission of recent standard texts and government and state bulletins is regrettable.

In the reviewer's opinion the text would have been more complete if it had contained chapters on such subjects as aeration, lightning protection, girdling root treatment, grading around trees, guying, intertree bracing, pollarding, vista cutting, topiary work, selection of species, tree guards, planting, tree removal, and safety practices.

It is the publisher's claim that "Practical Tree Surgery" is "an authoritative manual" which "covers the entire subject

for the first time". With this claim the reviewer sincerely regrets that he cannot agree wholeheartedly.

A. ROBERT THOMPSON,
National Park Service.



Statistical Methods Applied to Experiments in Agriculture and Biology.

By George W. Snedecor. xiii+333 pp. Collegiate Press, Inc., Ames, Iowa. 1937. Price \$3.75.

The forest or range research worker who knows Professor Snedecor's little book *Analysis of Variance and Covariance* will welcome his latest work. It is another example of his ability to clarify discussion of statistical analyses appropriate to experimental work in agriculture and biology for those unversed in mathematics. Indeed this is his aim, for, as expressed in a paragraph of the preface, "It is a fundamental belief of the author that statistical method can be used competently by scientists not especially trained in mathematics. The conditions surrounding the mathematical theorems can be set forth in terms quite readily understood by the lay reader. Since mastery of two sciences is possible for only few, it is necessary for most of us to advance by cooperation. To the mathematical statistician must be delegated the tasks of developing the theory and devising the methods, accompanying these latter by adequate statements of the limitations on their use. None but the biologist can decide whether the conditions are fulfilled in his experiments and interpret the results. The only mathematics used in this book is arithmetic, supplemented by enough symbolism to make the exposition intelligible."

Three of the sixteen chapters have to do with attributes and enumeration data; three with basic concepts of central tendency, of dispersion of observations and of means of observations, the variance of

sums and differences, and tests of significance; two with the analysis of variance as applied to planned experiments including the randomized block and latin square designs; five with covariance, correlation and regression; one with large sample theory; one with short cuts and approximations; and one with individual degrees of freedom including the factorial design.

Every discussion is well illustrated with one or more numerical examples worked out in detail; and following most of the sections, problem examples are given.

The book is a veritable storehouse of information on statistical procedures concerning field and laboratory research. It may, perhaps, be classed as a reference rather than as a text for student use. On this account, however, it should prove particularly valuable to the worker who is faced with the great variety of problems characteristic of investigations in all the fields into which forestry may be divided.

F. X. SCHUMACHER,
Duke University.



The Small Sawmill in New York. By Nelson Courtlandt Brown. *N. Y. State Coll. of Forestry Tech. Bull.* 50. 126 pp., 51 fig. 1937.

New York has more than 9½ million acres of forests, mostly second growth; about 400 sawmills—predominantly small, for only six have a capacity in excess of 10 M per day; and over 80,000 men employed in the wood-using industries. This bulletin should find wide use in New York State and outside too, because many points touched on concern universal problems in the small mill game, such as power requirements, types of saws, other mill equipment, logging and milling technique, transportation, seasoning, grading, merchandising, and business pitfalls. The bulletin is so chock full of topics, treated briefly, that I wonder if the discussion is

full enough to meet the needs of the average of the audience. Brown has done a good job in compiling information on a multitude of questions, including history and economics of forestry and lumbering in the state, selective cutting and methods needed to serve best the "interests of our forest resources", which by implication, at least, ties back the small mill to the soil and permanent forest land use.

Because the bulletin is primarily for extension purposes and the discussion is brief in many respects, a selected bibliography may be missed by those who wish to make further study of some special phase of the problem.

R. D. GARVER,
U. S. Forest Service.



Forest Protection. By Ralph C. Hawley.
262 pp. John Wiley & Sons, New York. 1937. Price \$2.75.

Those who have used Hawley's text *The Practice of Silviculture* already are acquainted with the general style and organization of this new book on forest protection, for it is an expansion of the forest protection sections formerly included in the silviculture text.

The new book, however, is 262 pages in length, compared to 104 pages when published as a part of *The Practice of Silviculture*. All the former chapters have been greatly enlarged. For example, 115 pages (almost half the book) are devoted to fire control in the new text as against 64 pages in the old text; there are 26 pages on insects, an increase of 16 pages; there is three times as much space on tree diseases; the chapter on natural phenomena has been enlarged from 4 to 37 pages. A new chapter discussing man as a source

of injury to the forest has been added, as have chapters on forest fire insurance and fire control costs, standards, and plans. The title of the former chapter on natural phenomena as sources of injury to the forest has been changed to protection against atmospheric agencies and expanded greatly.

The general plan of presentation is unchanged. No attempt is made to give detailed instructions for carrying on specific types of work. The purpose rather is to outline and discuss the principles that underlie protection. According to the author, "In a properly balanced forestry course, time adequate to develop specialists such as forest entomologists, forest pathologists or forest fire experts cannot be afforded. What can be done is to equip the student with a well-rounded-out knowledge of the forest protection problem as a whole in its relation to the growing of forests."

The author has adhered closely to that general plan. For those forestry schools which do not have time or do not want to take time to go more deeply into each of the many subjects comprising forest protection this should be a useful text. It appears, however, the most forestry schools prefer to require at least elementary courses in forest entomology, pathology and fire control; where this is done the generalized text probably will not be used. Nevertheless, this reviewer is inclined to believe that even when such separate elementary courses are given it is desirable to summarize and tie these courses together and this the new text should do very well. It might perhaps be used as a reference for supplementary reading in forest management courses.

RICHARD E. MCARDLE,
Rocky Mountain Forest and
Range Exp. Sta.



CORRESPONDENCE



DEAR HALL:

I am delighted that you sent me a copy of your attempt to blast the theme which I developed in a recent little article entitled "Forest Planning—How Far Can We See" in the JOURNAL OF FORESTRY.

Perhaps I did not make my chief point entirely clear. If so, I am sorry. But I am not a fraction as sorry as I think you should be for what looks to me like deliberately misstating the argument which I made, and then proceeding to blow the misstatement full of holes.

For example, you say that I exemplify by observation that "long range prophesy is a pleasant occupation" by prophesying a limitless future need for timber products. I make no such prediction. I do assert that there *may* be a need for all of the timber that we can raise, even though we keep all of the available forest land busy producing timber. I still feel that way. I still insist that no economist in this chaotic age of economic barbarism can look ahead the length of a timber rotation and give us a reasonable basis for any other policy than one of keeping our forest lands busy raising what they are capable of raising with such care as we are able to give them.

You refer to "starved consumption" as "a symptom and not the cause of the depression phase of the business cycle." I ask by what authority or by what logic you know this. If limited purchasing power is not one of the *major* causes, what in your judgment are the causes?

I did not express reliance upon a continued upward trend of producing power as you say I did. I merely referred to producing power as one of the major factors, the *unpredictability* of which should

discourage anyone from seriously trying to predict the demand for timber a rotation hence.

True, I did not discuss the differential costs of growing timber on various sites and of transporting it to consuming points. I think the differential costs or growth are irrelevant to the question of whether or not available forest land should be kept in a productive condition, and I challenge you to tell me where the consuming points will be a timber rotation hence.

I take particular zest in your paragraph discussing the soundness of producing timber for profit. It is always exhilarating to me to observe the antics of those who strive to rationalize forestry with the profit motive, and you do it *so* bravely. Your astonishment at the doctrine, which you ascribe to me, of considering it "reprehensible" to expect a return from growing timber is perhaps exceeded only by my astonishment at you, as a forester, in apparently not recognizing the more or less basic principle of forestry that timber growing is something that one generation puts its energy into not for profit, but as a duty to future generations.

Your wisecrack about "this planned scarcity of knowledge," is a direct misrepresentation of my arguments. Sadly, it is explainable only as a deliberate attempt to confuse the reader, or else as a subconscious aping of the clever but vicious methods of those economists who are hired to defend the profit system.

I wish to comment on your observations that "unprecedented efficiency in production" was achieved "in what Foster terms 'an age of economic barbarism'." Your inference is, I take it, that the fact of "un-

precedented efficiency in production" in itself tends to disprove that we have been living in an age of economic barbarism. Granted that we have had unprecedented efficiency in production. But at the same time we have muddled our way to an unprecedented inefficiency in distribution. The paradox of efficient production contrasted with tragically inefficient distribution is my basis for calling this an age of economic barbarism.

Your statement that "there is a limit to human effort and capacity to sacrifice in order to provide for future requirements," is, of course, a perfectly true one but seems to me trite and irrelevant. It implies that reasonably good care of the available forest lands would entail a tremendous burden upon the present generation. In view of the widespread unemployment and the needs of the unemployed for constructive work, observations such as this one of yours merely tend to throw a smoke screen over the real issues and to strengthen the stand of the reactionaries who apparently wish the country and the world to continue under the control of the big corporations and financial overlords of our misnamed democracy.

There is a source of some relief, but also a feeling of anti-climax and of having wandered from your main thesis, in your closing remark to the effect that the role of economic research is primarily to answer the question of "*which* acres and *how much investment* in cultural measures." I could almost agree with you on that, providing you would agree with me that the answer to the question of "*how many* acres" is *all* of the available acres, and that they should be devoted to multiple use forestry, producing not only timber species but also species valuable for

game food and cover.

I am sending a copy of this letter to the editor of the JOURNAL with the thought that, in the event he uses your paper, he may wish to publish this letter along with it.

E. A. FOSTER,

Director, Minnesota Division of Forestry.

DEAR FOSTER:


I have your letter of December 27. Since the signature indicates that you did not read this letter after your dictation was transcribed, I am left in some doubt as to whether it gives your present opinions with precision. If it does, they differ in some important respects from those indicated in your JOURNAL article.

I am sorry you think my comment misrepresents your argument. Every precaution was taken to avoid so doing, including the review by a number of competent persons of Josephson's article, your criticism, and my comment. I am confident that a careful and impartial reading of these papers will acquit me of misrepresenting your published statement, or of ascribing to you any opinion which you did not plainly express or imply.

In answer to your question as to the major causes of depression, I would refer you to the discussion of the business cycle in any college text book on economics. Chapter 30 of "Economics" by Fairchild, Furniss and Buck (Macmillan, 1937) would serve. The Economics Department of your State University doubtless would be willing to help you with other specific references.

R. C. HALL,

U. S. Forest Service.



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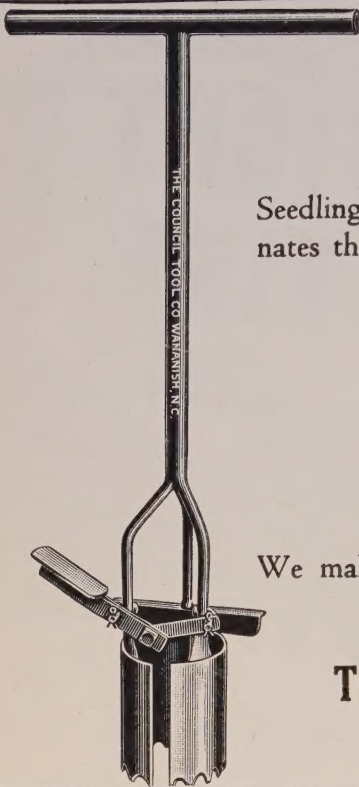
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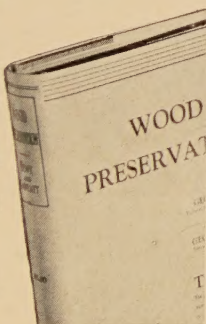
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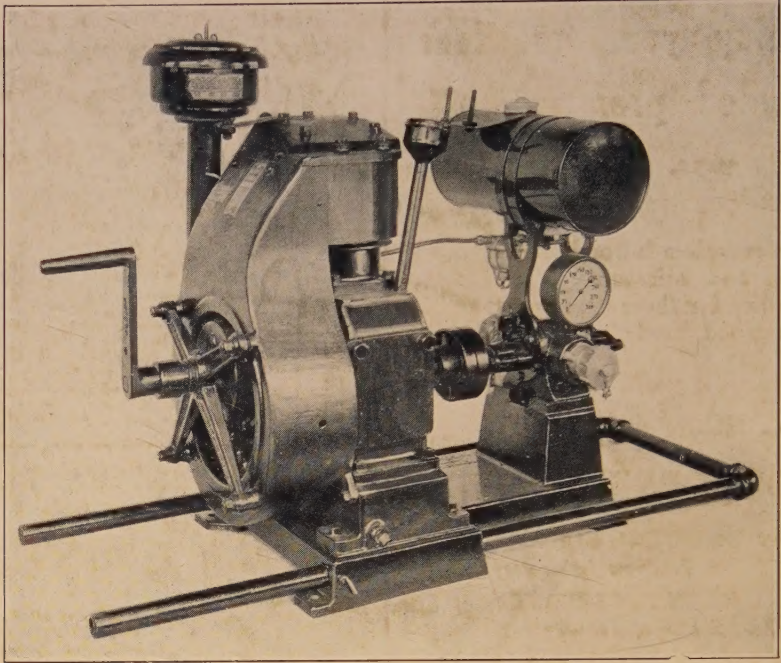
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